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Proceedings of the

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June 15, 1959

Southeastern Section———

A MILD-CURE CATALYST*

J B IRVINE, J K SIMONS, AND J H DAVIDS

Quaker Chemical Products Corp, Conshohocken, Pa

A mild-cure catalyst is described which is effective and practical for curing crease resistant finishes on woven goods and dimensional control finishes on knitted fabric.

The catalyst consists of a mixture of two inexpensive metal salts, namely aluminum chloride hexahydrate and magnesium chloride hexahydrate.

The limitations of cure time, cure temperature, ratio of salts and concentration in pad mix are discussed.

Laboratory evaluation of the action of the mild cure catalyst with five types of wash-wear finishing agents is described.

Four mill applications and resultant fabric evaluation are presented. These include woven goods and knitted fabrics.

THIS discussion relates to the methods of catalyzing resins and reactants used to impart wash-wear, crease-resistant, and dimensional-control effects to woven goods and dimensional-control effects to knitted goods. More specifically it is the discussion of a catalyst for curing such finishes at the same speed but at temperatures 50-100°F lower than those ordinarily used for curing. It may also be used for curing the finishes at greater speed but at temperatures only 25 to 50°F lower than those ordinarily used.

The present commercial practice for the production of wash-wear fabrics depends on the use of a number of reactive chemical compositions. Generally these are derived from formaldehyde by reaction with one or more substances which readily form methylol compounds. Among the reactive compositions are those referred to as urea-formaldehyde, melamine-formaldehyde, ethylene-urea-formaldehyde, modified melamine-formaldehyde, triazone - formaldehyde resins and acetal reactants. Many times these are referred to by briefer descriptive terms such as triazone or acetal.

When these finishes are applied to fabrics to impart wash-wear properties it is necessary that catalysts be used to insure their reaction with the cellulose fibers. A variety of catalysts is employed; the choice depends on a number of factors, e g, the resins used, the fabric type and construction, the specific finish properties desired, the equipment and the cost. The catalysts representing the widest range of usage fall into two classes, namely: the amine hydrochlorides and the metal salts. An exceptionally efficient combination of metal salts is the subject of this discussion.

It is also essential in obtaining wash-wear properties that the resin-treated fabric be given a suitable cure. It is at this time that the cellulose and resin finish interact resulting in a fabric with the desired properties. Commercial practice involves the heating of the fabric at temperatures between 300°F and 350°F for times of one minute up to seven minutes. The use of the longer times is undesirable for several reasons:

1. It requires a long-cure box or oven or else it necessitates the very slow movement of fabric through the cure box.

2. There may be tendering of the fabric.

3. It is more costly in time, fuel, and equipment.

However, with the presently-used catalysts it is not feasible to run for short times at temperatures lower than 300°F. Usually cure times of one to two minutes at a temperature of 315-320°F are required.

REQUIREMENTS FOR WASH-WEAR FABRIC

The principal requirements for a wash-wear fabric which must be provided by a suitable curing operation are the following:

1.) The wrinkle recovery property as measured by the Monsanto crease recovery method *(1)* should be 240-280° (warp plus filling). On most fabrics this represents a crease recovery increase of 80 to 120° over that of the fabric before treatment.

2.) The loss of wrinkle recovery caused by five washes in a home-type washer should be not more than 30° (warp plus filling). For after-washed fabrics this should be even less.

3.) The loss in tensile strength caused by resin finishing the fabrics should *never* be more than fifty per cent of the strength of the untreated cloth. Thirty-five per cent tensile loss is considered about normal.

4.) The loss in tensile strength brought about by five washes containing active chlorine should be not more than 10-15% of the original treated strength of the cloth.

There are other factors involved in what is called a wash-wear finish. Odor development on cured fabric

* Presented by Mr Irvine before the Southeastern Section, February 21, 1959.

and color development must be absent. More recently the properties of wet crease resistance *(2)* and wash-wear appearance are being considered in such fabrics. Still other factors are of importance during processing, viz, bath stability and compatibility with auxiliary finishing agents such as hand builders and/or softeners and dyefixes.

Some years ago a catalyst which would provide an efficient cure below 300° would have been a boon to many of the woven goods processors because they did not have the high temperature curing ovens which are in general use now. At present the number of woven fabric finishing plants where higher temperatures are the limiting factor in curing capacity has been reduced by the installation of gas-fired ovens.

On the other hand the knit goods industry, which has just recently become interested in thermocuring finishes, is equipped with very few high temperature curing ovens.

Therefore, this mild-cure catalyst may be of considerably more service to the knit goods processors than to the woven goods finishers.

CONSTITUENTS OF THE MILD-CURE CATALYST

The essential ingredient in the mild-cure catalyst is aluminum chloride. The possible use of aluminum chloride to catalyze resin function has been recognized for a long time. Its use in connection with textiles has two disadvantages which have made it unacceptable.

1.) The permanent and high acidity of the substance results in excessive tendering of cellulosic fabrics.

2.) Its high acidity catalyzes resin condensation in the bath thus causing precipitation in the bath.

The use of a certain proportion of magnesium chloride with the aluminum chloride removes the undesirable effects of the latter salt and allows it to become a very useful catalyst. The bath stability is increased so that catalysis leading to resin precipitation does not take place readily. The reactions of the resins or reactants with the fabric are catalyzed so that they occur at 200 to 300°F which is from 50 to 100°F lower than has heretofore been possible. Another result is that the excessive tendering of the fabric which would ordinarily take place with aluminum chloride is prevented.

METHODS

The experimental work in developing this catalyst was carried out on 80 x 80 cotton print cloth. The tensile strength of this fabric before treatment was 71 lbs in the warp and 46 lbs in the filling. The crease resistance of the untreated fabric was 150° (W + F). Wet pickup of all applications was made at 100% on the weight of the fabric so that bath concentrations and the percentages of the ingredients applied to the fabric are identical. In order to avoid curing during the drying operation all drying was done below 180°F and with just sufficient time to get the fabric dry.

The basis for the evaluation of effectiveness of the individual treatments is presented in Figure 1. Herein crease resistance increase (CRI) rather than the total crease resistance is used to assess the beneficial effect of the treatment. This is the gain made by the application of the finishing agent.

The major tensile loss (MTL) is the largest percentage loss of tensile strength whether it be in the warp direction or in the filling direction. The MTL is the price paid for the CRI gained.

The relative effectiveness (CRI/MTL) of various treatments can be compared by determining how many degrees increase in crease resistance are obtained in return for each per cent tensile loss. This ratio will be termed the efficiency factor throughout the remainder of this discussion.

The CRI for satisfactory laboratory treatments usually falls between 90° and 120° whereas that for satisfactory mill treatments generally ranges from 80° to 110°.

The filling direction, which is often the weakest direction of the fabric, is the one which usually incurs the major tensile loss.

In mill finishing for wash-wear effects tensile losses under 30% are considered good, those in the thirty to forty per cent range are usual, and those over 45% are considered to be too drastic.

The normal efficiency factor for satisfactory laboratory treatments is about 2.7 and that for satisfactory mill treatments is about 2.5. An efficiency factor over 4.0 sometimes indicates an undercure which can be detected by examining for low wash durability of the crease resistance. Efficiency factors under 2.5 generally arise from too much tensile loss.

It may be helpful to examine some of the data obtained in the development of this catalyst. An acetal reactant* has been used as the wash-wear finishing agent for these determinations. The bath concentration was 8%.

The effects of aluminum chloride hexahydrate alone cured one minute at 250° F can be seen in Figure 2.

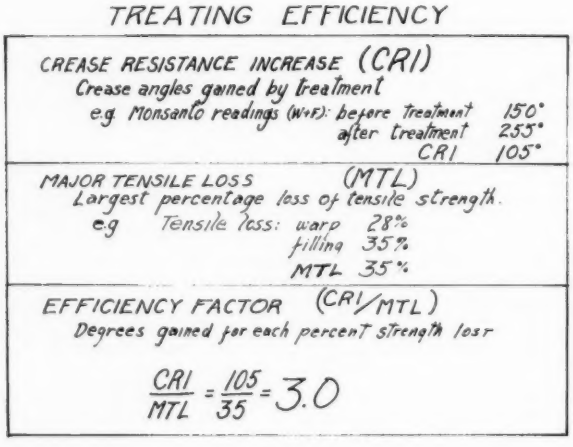
TREATING EFFICIENCY
CREASE RESISTANCE INCREASE (CRI)
Crease angles gained by treatment
e.g. Monsanto readings (W+F): before treatment 150°
after treatment 255°
CRI 105°
MAJOR TENSILE LOSS (MTL)
Largest percentage loss of tensile strength.
e.g. Tensile loss: warp 28%
filling 35%
MTL 35%
EFFICIENCY FACTOR (CRI/MTL)
Degrees gained for each percent strength lost
CRI/MTL = 105/35 = 3.0

Figure 1

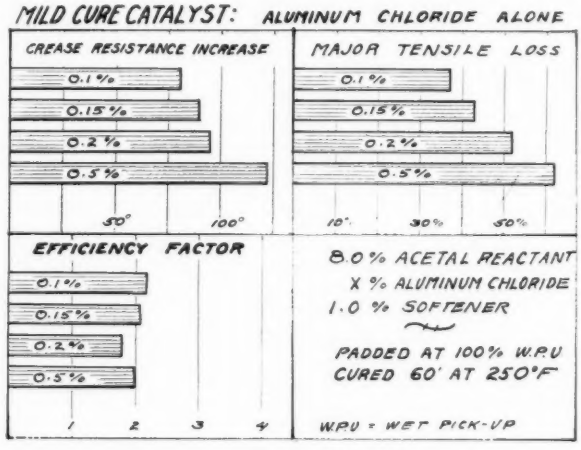

Figure 2

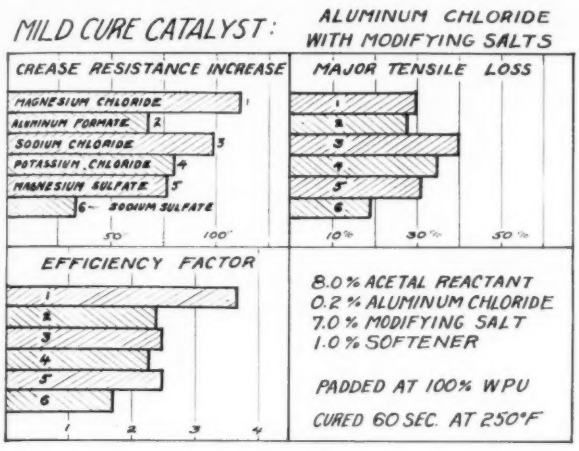

Figure 3

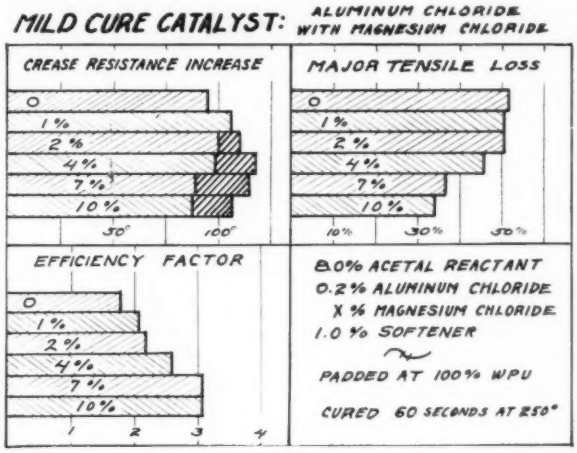

Figure 4

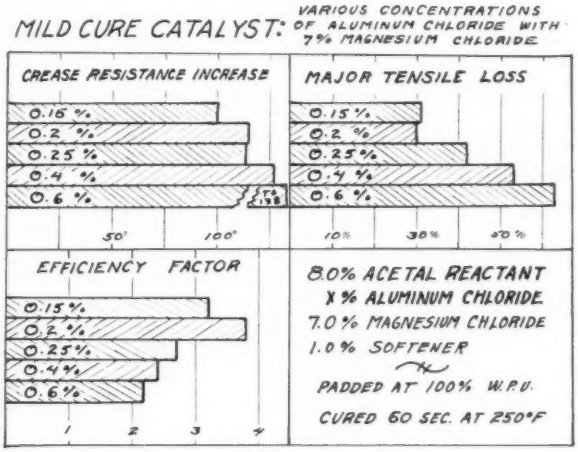
MILD CURE CATALYST: VARIOUS CONCENTRATIONS OF ALUMINUM CHLORIDE WITH 7% MAGNESIUM CHLORIDE
CREASE RESISTANCE INCREASE
MAJOR TENSILE LOSS
EFFICIENCY FACTOR
8.0% ACETAL REACTANT
X % ALUMINUM CHLORIDE
7.0 % MAGNESIUM CHLORIDE
1.0 % SOFTENER
PADDED AT 100% W.P.U.
CURED 60 SEC. AT 250°F

Figure 5

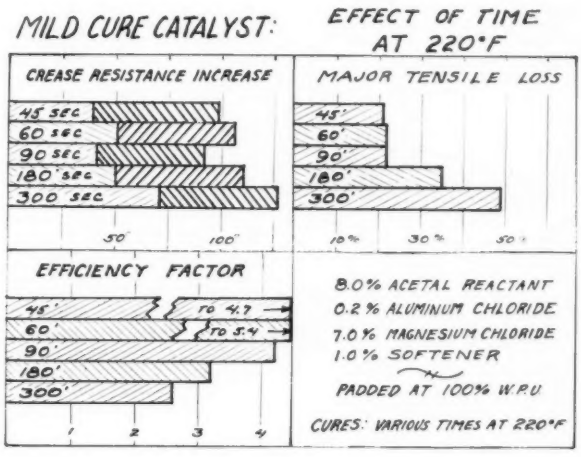

Figure 6

Crease resistance increases ranging from 80° to 120° can be obtained by the use of very small quantities of aluminum chloride as a catalyst. The accompanying tensile losses, however, range from 37% to more than 60%. These normal crease resistance increases and the corresponding high tensile losses result in low efficiency factors. This certainly falls short of the 2.5 to 3.0 range which is about medium for the efficiency factor for laboratory treatments. Aside from the previously mentioned disadvantages of aluminum chloride these low efficiency factors indicate that a modifying system is necessary to obtain satisfactory results and still allow the mild cure to give the proper crease resistance increase.

Accordingly, many modifying salts were tried with the aluminum chloride. The results obtained by some of these are shown in Figure 3. The largest CRI values were obtained with magnesium chloride hexahydrate and with sodium chloride. However, the sodium chloride permits the greatest tensile loss. Examination of the efficiency factors shows that the magnesium chloride hexahydrate which, at higher curing temperatures is already known as a satisfactory catalyst, is the most effective modifier for the aluminum chloride.

It is necessary to know how much modifying salt is needed. Figure 4 shows the effects of several concentrations of modifying magnesium chloride hexahydrate with 0.2% aluminum chloride hexahydrate.

The entire series yields CRI values in the satisfactory range.

The low percentages of modifying salt permit the MTL values to go into the destructive range but quantities of 4% and more reduce the tensile loss to an acceptable level without interfering with the CRI.

The 4, 7, and 10% concentrations produce satisfactory efficiency factors.

Wash durability is good for all quantities although it seems to be inversely affected by increasing quantities of magnesium chloride. This is indicated by the heavily-shaded areas in the CRI panel. These represent the reduction in crease resistance which is brought about by five home launderings.

From this the 4 to 7% concentration of modifying magnesium chloride may be considered satisfactory.

A cross check series to determine whether some concentration of aluminum chloride other than 0.2% would be more efficient with the modifying salt is depicted in Figure 5.

CRI values range from 100° to 138° and the MTL values range from 30 per cent up to 53%. The efficiency factors confirm the ratio of 0.2%

* Quaker Reactant 53

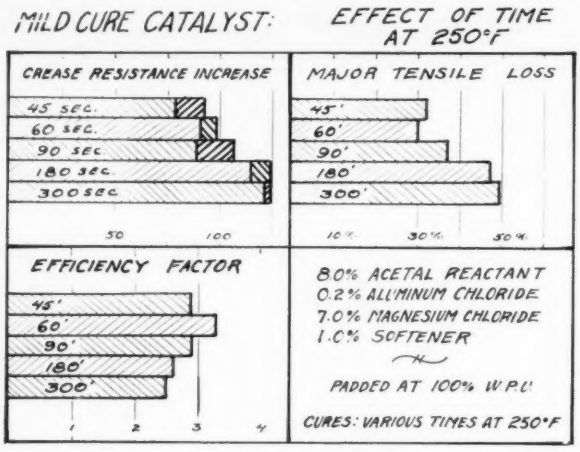

Figure 7

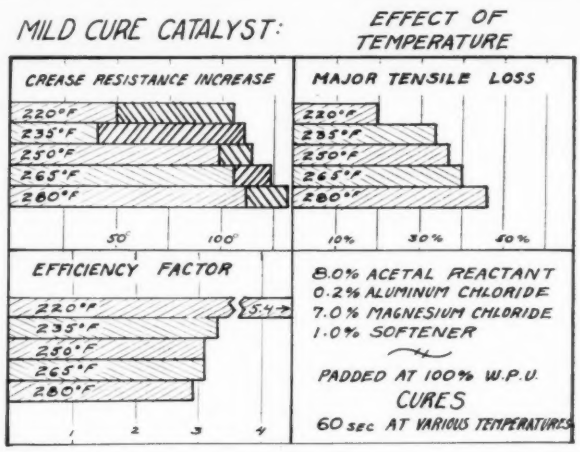

Figure 8

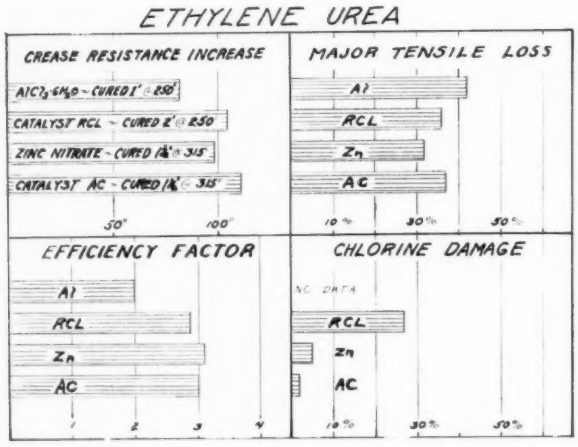

Figure 9

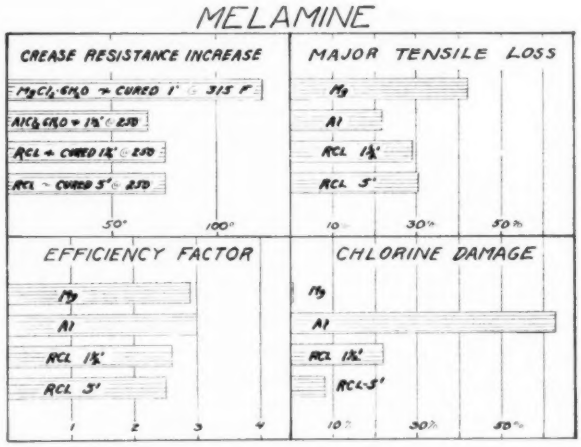

Figure 10

aluminum chloride hexahydrate to 7.0% magnesium chloride hexahydrate

In checking the effect of time (Figure 6) from forty-five seconds to five minutes a cure temperature of 220°F was first examined. The CRI values are all high. Only at the 5 minute baking time did the major tensile loss approach 50%. The efficiency factors for 45, 60, and 90 seconds are all above 4.0 because of the very low tensile losses occurring at these cure times. Accordingly, durability of the crease resistance was examined and it was found that all of the cures at 220°F produced finishes of poor durability to laundering.

A similar series cured at 250°F (Figure 7) produced an almost identical range of CRI values. The major tensile loss values are in the normal range at the shorter time cures and yet the long bake (5 minutes) produced no worse tensile loss at 250° than it did at 220°F. At this temperature the efficiency factors are all satisfactory with that of the one-minute cure being best. At 250°F the durability of the entire series is satisfactory. This places cure time in the proper range for industrial use.

Figure 8 shows the effects produced by curing one minute at several temperatures. The CRI values are all quite acceptable for temperatures from 220°F to 280°F. The MTL values increase with increasing temperature the worst being 46% loss at 280°F. The efficiency factors obtained by curing from 235°F up are satisfactory. The determination of wash durability clearly indicates that 250°F is about the minimum effective temperature to be considered regardless of the cure time involved.

Figures 6, 7, and 8 have shown that the mild-cure catalyst can be used over a fairly wide range of temperatures and a very wide range of times. Shorter cure times at higher temperatures are probably feasible too, but such a combination will require more careful control.

A proprietary composition bearing the designation Catalyst RCL has been formulated and used commercially. In the remaining figures the above designation will be used to indicate a mixture containing aluminum chloride hexahydrate and magnesium chloride hexahydrate in a ratio of 0.2 to 7.0 in the pad mix.

Acetal reactants were used in the evaluations involved in developing the mild-cure catalyst because the catalyst was especially intended for use with them. However, the other types of generally used crease resistant finishing agents have also been examined with the mild-cure catalyst.

In each of the following cases the effects produced by curing at 250°F with the aluminum chloride-magnes-

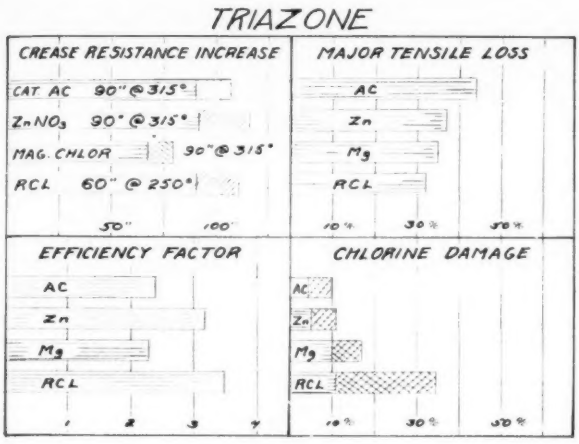

Figure 11

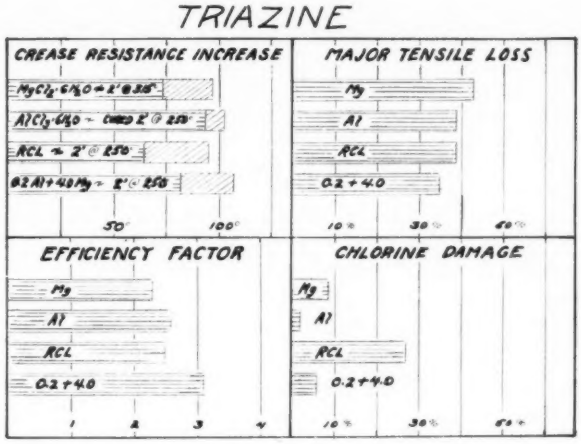

Figure 12

ium chloride combination have been compared to those produced by using the already known catalysts at the generally used curing temperature of 315°F.

Figure 9 shows the effects produced on a dimethylol ethylene urea product. The mild-cure catalyst very closely matches the zinc nitrate and Catalyst AC in CRI, MTL and efficiency factor.

An additional evaluation now comes into consideration. Initial chlorine damage *(3)* was determined for the three catalyst-cure combinations. The zinc nitrate and Catalyst AC produced DMEU treatments with the normally low initial chlorine damage figures but the Catalyst RCL permitted a higher initial chlorine damage. A thorough investigation for the proper combination of salts, time and temperature may lead to effective mild curing which will bring this initail chlorine damage value under 10%. However, this remains to be done.

Figure 10 shows the effects produced on a melamine product. Here the magnesium chloride hexahydrate alone at 315°F produces a superior crease resistance, a better efficiency factor and a much lower initial chlorine damage figure. It is interesting to note here that the five minute mild cure reduces the initial chlorine damage to considerably less than that of the 1½ minute cure but still not as low as the 1% obtained with the magnesium chloride hexahydrate alone. It was also observed in this series of tests that the samples cured with the Catalyst RCL yellowed severely on exposure to chlorine.

Figure 11 presents the results of curing a triazone with the mild-cure catalyst and with the three most widely used catalysts for curing at higher temperatures.

All but the magnesium chloride give satisfactory CRI values. Major tensile losses range from 32 to 43%, all being acceptable. Efficiency factors are best for the zinc nitrate and Catalyst RCL. Initial chlorine damage is at or under 10% which is characteristic of triazone treatments.

The additional susceptibility to chlorine damage produced by five additional launderings is shown by the darkly shaded extensions in the chlorine damage panel. It is possible that a slightly more vigorous cure (e. g. 1½ min. at 250°F or 1 min. at 265°F) will maintain satisfactory treating efficiency and at the same time reduce the susceptibility to increased chlorine damage by repeated launderings.

Figure 12 shows the results of curing a triazine containing product with magnesium chloride, with aluminum chloride and with two combinations thereof. The CRI values are all of the same magnitude and the tensile losses range from 43% for the magnesium chloride down to 34% for the catalyst containing 0.2% aluminum chloride and only 4% magnesium chloride. The efficiency factor for the latter is above 3.0 and the initial chlorine damage is under 10%. The results of this series, wherein one ratio of the two salts is more effective than another, suggest that there may be a proper combination of the two salts which can act as a mild-cure catalyst for each of the resins previously described.

In Figure 13 the results of curing an acetal reactant with the mild-cure catalyst and with magnesium chloride are compared.

The CRI values are about equal. The five wash durability is slightly better with the mild-cure catalyst, both being good. The MTL value

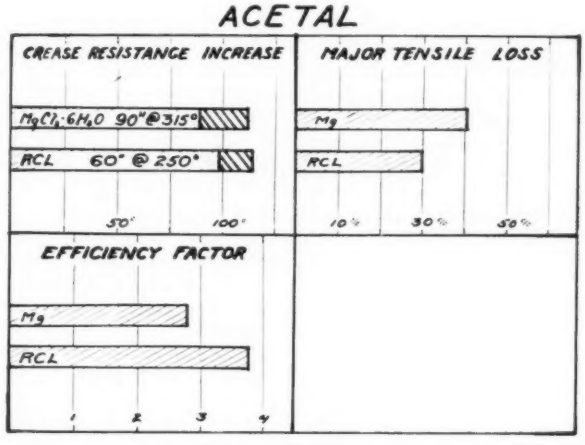

Figure 13

here differs noticeably and as a result the efficiency factor for the mild cure catalyst is considerably higher than for the magnesium chloride.

The preceding laboratory evaluations of the mild-cure catalyst suggest several practical applications for which it may be quite useful.

PRACTICAL APPLICATIONS

First is the low temperature curing of cotton knit fabrics. This is the purpose for which the catalyst was developed. Many pieces of knit goods machinery cannot reach the temperatures at which resins and reactants are normally cured on woven fabrics. Even where the higher temperatures can be reached in a loop dryer the handling methods for knit goods do not permit the careful time control that is necessary with normal catalysis at 300-325°F. The time-temperature combination needed for handling knitted fabrics in the existing loop dryers is one in which the temperature can be maintained at 250-265°F. At these temperatures a wide range of times will give a satisfactory cure. There is very little danger of overcure resulting from too long an exposure to the curing conditions.

TABLE I
COTTON KNIT GOODS

Formula

13.0% Reactant 16	7.5% Softener
16.0% Catalyst RCL	0.5% Wetting Agent

Processing

Wet Fabric Padded at 30% WPU Dried and Cured — Single Pass — Loop Dryer — Total Time for Dry-Cure — 25 Min. — Temperature — 250°F

Evaluation

	Untreated	*Treated*
Courses	29	27
Stretch during processing	—	6.9%
Length Shrinkage—5 washes —Tumble dried	11.7%	7.4%
Ball burst strength	92 lbs	67 lbs

Table I is a resume of the results obtained in mill work under just such conditions as are described above. The object of this treatment is to exert dimensional control on the length of the knit goods. The indicated treatment bath was applied to wet fabric at approximately 30% wet pickup. Note that the drying and curing are both carried out in a single pass through a loop dryer. The total time for passage through the dryer is 25 minutes, about 12 or 13 of which were required to dry the fabric and the remainder of which were curing time. The finished fabric displayed only 7.4% length shrinkage in five washes with tumble drying despite having been elongated almost that much during processing.

This is to be compared to 11.7% for the untreated unstretched fabric. The loss of strength was only 27% leaving the fabric with an ample ball-burst strength of 67 lbs.

TABLE II
PRODUCTION SPEED ON WOVEN GOODS

	Reactant-53 with $MgCl_2 \cdot 6H_2O$	*Reactant-53 with Catalyst RCL*
Curing Speed	90 ypm	150 ypm
Cure Temperature	320°F	270°F
Cure Time	103 sec	60 sec
CRI	102°	81°
MTL	38%	30%
CRI/MTL	2.7	2.7

The second suggested practical use for the mild-cure catalyst is that of increasing the speed of fabric processing. Table II presents the results obtained in comparison runs wherein the mild-cure catalyst was used at a curing temperature of 270° to enable a higher production speed. For the conventional catalyst and cure system the frame and cure box were operated at 90 yards per minute whereas with the mild-cure catalyst a lower temperature and a higher speed (150 yards per minute) were employed. Both the crease resistance increase and the major tensile loss were higher for the conventional catalyst. The efficiency factors for the two are alike.

It should be stated here quite clearly that the use of this catalyst at temperatures above 275°F will be a risky procedure and will require exceptionally careful handling with regard to the time of curing. Stoppage with fabric in the frame or oven at higher temperatures will result in destructive tensile loss. For example, in some mills the collection of fabric in a scray between the drying and curing steps is avoided to prevent wrinkling before curing. The fabric is batched on a roll after drying and then is taken directly from the roll into the cure box. Under these circumstances the machinery must be halted while a new roll of fabric is sewed to the end of the preceding one. This procedure is not apt to lead to trouble with the mild cure catalyst at temperatures below 275°F but it could cause damage to the fabric at temperatures above that.

Table III shows the results obtained by using the mild-cure catalyst to frame cure fabric in that rare circumstance where a woven goods mill today does not have a cure box. The fabric was partly dried on cans and then given a dry-cure pass through a frame at 315°F. In this case the fabric received about 20 seconds of

TABLE III
Frame Curing of Woven Goods

Formula

12.0% Reactant 53	3.0% Softener
9.0% Catalyst RCL	0.1% Wetting Agent

Processing

Padded at 70% WPU
Partly dried on cans
Frame cured 20–25 seconds
Washed, softened, dried & calendered

Evaluation

		Acetal Treated with Mild Cure Catalyst and Frame Cured	*Similar Wash/Wear Fabric Treated with Resin and Cured 2 Minutes at 315°F*
Tensile Strength	Original	47 x 31 lbs	44 x 35 lbs
	10 Wash	44 x 30 lbs	39 x 35 lbs
Crease Angles	Original	243°	257°
	10 Wash	249°	246°

curing. This data was cited in an earlier paper. *(4)* Tensile strengths and fixed finish of about the same level are hereby produced by the very short time (20 sec) cure with the mild-cure catalyst and by a resin cured in the conventional manner (90 sec at 315°F) in another mill. Incidentally, the personnel at this mill did not try to use this as a production method.

TABLE IV
Low Temperature Cure on Woven Goods

	Untreated	*Reactant-16 with $MgCl_2 \cdot 6H_2O$*	*Reactant-16 with Catalyst RCL*
Curing speed	—	80 ypm	80 ypm
Cure time	—	110 sec	110 sec
Cure temperature	—	300°F	250°F
Warp shrinkage 1 wash	5.6%	2.1%	1.0%
Warp shrinkage 5 washes	6.3%	2.7%	1.6%
MTL	—	12.9%	11.3%

The third practical possibility of curing with the mild cure catalyst is that of using lower temperatures on woven goods. This is useful on very low strength fabrics where it is necessary to exert better dimensional control at no more than the usually incurred tensile loss. In Table IV the results of such a treatment are shown. Here the mild-cure catalyst is used at 250°F in comparison to magnesium chloride at 300°F. Both treatments have exerted good dimensional control on the fabric but that obtained by the use of the mild-cure catalyst is better. The MTL values are about the same.

A fourth practical application of the mild cure suggests itself. Some recent investigations *(5) (6) (7)* have been aimed at application of the

(Concluded on page 50)

Western New England Section———

DECORATIVE FABRICS FROM FIBROUS GLASS*

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THE textile industry is not a static business. The history of weaving cloth is the history of man's changing needs and the development of new methods to better serve those needs. The most dynamic change in textile technology, in our lifetime, has been the introduction of man-made fibers—and one of the most significant and promising of these man-made fibers is glass fibers.

Glass-fiber yarns that are used in the decorative field are of the low alkali, lime, alumina, boro-silicate type, the exact composition varying with the specific end use for the glass yarn. The materials contained in the glass composition formula serve a specific purpose. We thus have a pre-planned man-made fiber having desirable properties. Silicon dioxide, which is ordinary sand, and boric oxide are the glass formers; sodium, potassium, calcium, and aluminum oxides act as modifiers of the glass network. The weathering properties of glass yarns are improved by incorporating in the glass formula aluminum oxide. The addition of calcium oxide increases water resistance; and increased process efficiencies are achieved by the addition of an alkali in the form of sodium and potassium oxides.

These raw materials are fed into a batch furnace where they are combined and melted at temperatures in excess of 3000°F. At this temperature these materials fuse to form an inorganic polymer. The molten glass is then formed into marbles.

In the manufacture of a continuous filament yarn, the marbles are remelted in small furnaces called bushings, which are electrically heated to maintain a temperature of 2500°F. Due to the pull of gravity, the molten glass flows downward and passes in streams through 204 orifices located on the bottom of the bushing. These glass streams, while in the molten state, are attenuated into filaments and wound onto a package by a high-speed winder. As the glass is attenuated and wound, a sizing material or binder, containing film formers and lubricants is applied to the strand of glass filaments. This binder provides strand integrity, keeping the 204 individual filaments together, and thereby assisting in further fabrication of the yarn. It also improves the abrasion resistance of the glass yarn by decreasing the extremely high coefficient of friction of fiber on fiber. As the molten glass is attenuated to extremely fine individual filaments, the flexibility of the fiber increases, since this property, fiber flexibility, is a direct function of filament diameter.

Further processing of the glass yarn, such as twisting, plying, warping, and weaving of glass fabrics, is accomplished by conventional textile fabricating equipment.

Figure 1 represents a schematic of the forming operation.

In general, decorative fabrics woven from any fiber, Fiberglas included, must be dyed and finished to yield a fabric possessing functional and aesthetic values.

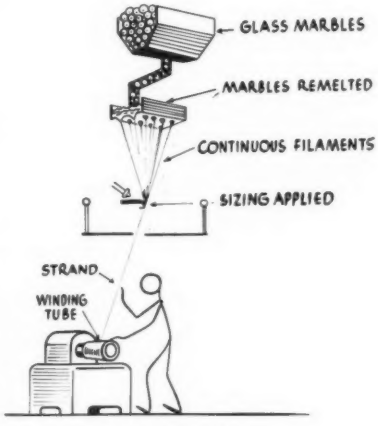

Figure 1
Schematic of the forming operation for continuous filament Fiberglas yarns

How are glass fabrics finished?

Decorative glass fabrics are dyed and finished by a process called *Coronizing*. All decorative glass fabrics must be Coronized. To date, there is no satisfactory alternative method for finishing decorative glass fabrics.

What is the Coronizing process?

The Coronizing process calls for the passing of glass fabrics through a muffle furnace at approximately 1200°F for five to 20 seconds. Three important and necessary phenomena occur as the fabric passes through this oven.

First, the organic size or binder, having served its fabricating purpose, ignites and is converted into the gaseous state. In this manner, glass fabrics are desized. Enzyme action and scouring of glass fabrics are not required.

Secondly, fiber stresses and strains inherently present in the glass yarn due to yarn fabrication are relieved, thus imparting drapeability and crease-proofing to the glass fabric.

The permanent crimping of the glass fibers is the third phenomenon occurring during the fabric's passage through the oven. This phenomenon can be compared to heat setting of nylon or Dacron fabrics. Glass fabrics are true "wash-and-hang" fabrics because glass fibers inherently possess perfect elasticity, ie, glass fibers return to their original length and shape with no hysteresis.

Leaving the muffle furnace, the glass fabric possesses poor abrasion resistance; therefore, a finish imparting fiber protection must be applied to the fabric. Film-forming thermoplastic resins, such as polyvinyl alcohol, butadiene acrylonitrile copoly-

* Presented before the Western New England Section on January 23, 1959 at Shelton, Conn.

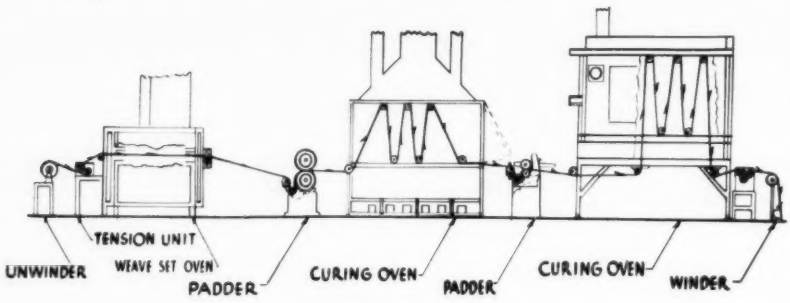

Figure 2
Schematic of the Coronizing operation

mers, polyacrylate emulsions and polyfluoroethylene dispersions, modified by cationic softeners, are applied by a conventional textile padder to impart fiber protection and to bond pigments when a piece-dyed fabric is desired. Inclusion of pigments in the resin bath is necessary to obtain the desired coloring of the fabric due to the nonporous compact nature of fibrous glass. The finishing materials that are applied to glass fabrics have been carefully selected to impart desirable properties and to further enhance the properties of glass fibers. Only pigments with exceptionally good lightfastness—100 hours or more—are used to color glass fabrics.

Following the application of the resinous finish, the fabric then passes through a curing oven. At this point, the glass fabric possesses ALL the desired properties except one—washability. Washfastness is imparted by applying a stearato chromic chloride Werner complex (Quilon), which exhibits tenacious affinity for glass surfaces due to the chromium-oxygen linkage. Following this application, the fabric is dried, cured and batched.

The Coronizing operation is continuous, requiring only a few minutes for the fabric to complete its passage. Various parameters must be carefully controlled since rigid and exacting quality control specifications must be maintained. There are *no* rehandled glass fabrics.

Figure 2 represents schematic of the Coronizing operation.

After Coronizing, glass fabrics either are made into draperies or they may be printed. Coronized fabrics are roller or screen printed with resin-bonded pigment systems on conventional textile printing equipment. Currently, there are three oil-in-water resin-pigment systems that are recommended for the screen printing of glass fabrics. An epoxy-based print system can be printed on glass fabrics that have not been treated with Quilon. After being printed, the fabric must be Quilon-treated to impart washfastness. For Quilon-treated fabrics, which are water repellent, two other systems—one of which is an oil-in-water emulsion based on polyacrylic acid is available. To print over Quilon-treated fabrics, a special printing assistant must be added to the print paste.

For roller or machine printing, a water-in-oil system based on alkyd-melamine and polyacrylic resins, with the printing assistant, is recommended. Butadiene-acrylonitrile copolymer latex is included in all systems to improve anticrock properties. The printed fabric must be cured according to a time/temperature relationship peculiar to each plant and its equipment. Curing conditions such as 300°F for five minutes or 350°F for three minutes are typical.

Scouring of the printed fabric may be desirable, especially if the printed design has heavy overlays or large printed areas.

Recent developments have seen the addition of two glass yarns to the growing "Fiberglas Family of Yarns."

Within the past few months, a bulk or textured yarn called Aerocor has been developed. This yarn has all the characteristics of a staple fiber—including softness, fullness and warmth. Aerocor yarns are produced by causing continuous disorientation with subsequent contraction of the input yarn.

Figure 3 represents a close-up of two yarn diameters, before and after texturizing.

A second significant development, recently announced by Owens-Corning Fiberglas Corp is the successful production of a colored yarn, called Coro-Dyed Yarn.

Since the introduction of glass fibers into the decorative market, a demand for a colored yarn has been increasing with the continual growth of glass decorative fabrics. Today, because technological details have been overcome, colored glass yarns are available to designers and weavers.

These unique Coro-Dyed yarns are capable of withstanding the extreme heat present in the Coronizing operation. Moreover, the pigments selected do not chemically decompose or sublime during the Coronizing operation.

Now, no longer is a designer restricted to weaves or patterns having monochrome effects. Striped and plaid effects are examples of designs which can be woven with these Coro-Dyed yarns.

How are Coro-Dyed yarns produced?

Coro-Dyed yarns are produced by passing single ends of yarn continuously through a carefully formulated

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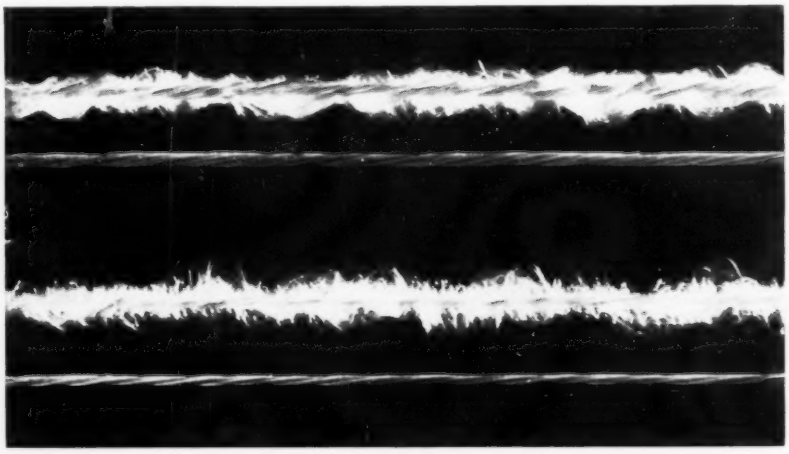

Figure 3
Close-up of two yarn diameters, before and after texturizing

South Central Section———

BLENDS OF POLYFIBERS WITH COTTON ADVANTAGES—DYEING AND FINISHING TECHNIQUES*

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INTRODUCTION

IN the past few years the growth of fabrics made from "Dacron" polyester fiber, "Orlon" acrylic fiber, and nylon blended with cotton have increased at a rate beyond expectation. Blends of "Dacron" and cotton have had the most spectacular growth, but blends of "Orlon" and cotton and of nylon and cotton are finding increasing acceptance. This paper is intended to summarize the advantages and dyeing and finishing techniques for these blends.

"DACRON" AND COTTON

Let us consider first blends of "Dacron" and cotton and particularly the most important blend which is 65 per cent "Dacron" and 35 per cent cotton. This blend has grown from one fabric type (shirtings) into a whole series of fabric types and styles, finding application in uses that range from lingerie to suitings. The characteristics of fabrics of "Dacron" and cotton which are responsible for their acceptance by the textile industry and by the consumer are as follows:

1. Dimensional Stability. A properly finished fabric of "Dacron" polyester fiber and cotton can be made more stable than an all-cotton fabric. Such fabrics have shown less than one per cent shrinkage after 10 "Sanforized" wash tests.

2. Excellent Color Fastness. When "Latyl" dyes are used, the fastness is equal to that of vat dyes on cotton.

3. Wash and Wear. This property is built into the fabric and the consumer is not confronted with the variable performance of resin-treated fabrics. He is assured of continuing acceptable performance after repeated washings.

4. Long Wear Life. This quality is inherent in fabrics of "Dacron" and cotton because of the high strength and high abrasion resistance of the "Dacron".

5. Resistance to Chlorine Bleaches. Fabrics of "Dacron" and cotton are not affected by home or commercial chlorine bleaches while in many cases resin-treated cottons are degraded by such treatments.

6. Durable Pleats and Creases. Finished fabrics of "Dacron" and cotton can be durably pleated. This depends on the thermoplastic character of the "Dacron".

7. Easy to Cut and Sew.

8. No Storage Discoloration Problems. Fabrics of "Dacron" and cotton remain white after prolonged periods of storage.

It is understandable that if a fabric is to gain wide acceptance it must be adaptable to high-speed, low-unit-cost dyeing and finishing processes. Except for a few special considerations the finishing procedures used for blends of "Dacron" polyester fiber and cotton are those used for finishing a high quality cotton fabric. Table I shows a comparison of the finishing procedures for the two types of fabric.

TABLE I
Finishing Route—"Dacron"/Cotton vs. Cotton

	COTTON		*"DACRON"/COTTON*
	Singe	1	Desize
	Desize	2	Rope Scour
	Rope Scour	3	Mercerize
	Mercerize	4	Heat Set
	Bleach	5	Singe
	Vat Dye	6	Bleach
	Frame Finish	7	Vat Dye
	Compressive or Resin Shrink Treat	8	Frame Finish
		9	Compressive Shrink

The obvious differences are the change in the sequence of singeing and the addition of the heat setting step. These changes are made to overcome the pilling and thermal shrinkage characteristics which are peculiar to "Dacron" polyester fiber.

Let us first discuss pilling. There are three factors, each equally important, that influence pilling propensity. These are as follows:

1. Yarn construction.
2. Fabric construction.
3. Finishing.

It is possible to have the proper yarn and fabric construction and because of poor finishing have a high pilling propensity. On the other hand, if the fabric had inadequate yarn or fabric construction there is not much the finisher can do about it.

From the standpoint of yarn construction, singles yarns should have a twist multiplier of 4 and above. When the twist multiplier is considerably below 4, the resulting fabric has a high pilling propensity even though good finishing procedures are used. Fabrics from plied yarns are less prone to pilling than corresponding fabrics from singles yarn.

With regard to fabric construction, the plain weaves are the easiest to make pill resistant and, as the length of the float increases, as in sateens and sheens, the more difficult becomes the job of making the fabric pill resistant. Sleazy fabrics, regardless of the weave, are more prone to pilling than properly constructed fabrics.

The two most widely applicable and successful finishing processes for controlling pilling are singeing and heat setting. Thus singeing has a more important role in finishing fabrics of "Dacron" polyester fiber and cotton than it does in finishing all-cotton fabrics and is critical to the production of high quality fabrics. It is of

* Presented before the South Central Section at the Patten Hotel, Chattanooga, Tenn, March 29, 1958.

prime importance that the singer be designed to give a close, even singe and that it be maintained in top operating condition. The slowest speeds possible without degrading the fabric should be used. Wet singeing permits lower speeds without degrading the fabric.

Referring to Table I which compared the finishing sequences of 100 per cent cotton and blends of "Dacron" and cotton, it is noted that the sequence of singeing had been changed for fabrics of "Dacron" and cotton. Some mills may gray singe, but we believe it is a dangerous practice for the following reasons:

1. Sizes, oils, grease, and dirt may be set into the cloth.
2. Loom nonuniformities and reediness may be set into the cloth.
3. The gray singe contributes little toward pilling control since the size film protects the long fibers from the flame.

The heat setting step has two functions—(1) pill control and (2) shrinkage control. Heat setting to control pilling should be done in the temperature range of 385 to 410 degrees Fahrenheit and for shrinkage control the temperature should be 50 degrees higher than any subsequent heat exposure expected in further finishing or garment use. Setting is done on a variety of equipment including gas fired tenter frames, resin curing ovens, hot roll contact type machines, air lay boxes, and radiant heat units. When setting is done on other than tenter frames it is necessary to frame the goods first to a uniform width. When fabrics are dyed to light shades or left white, heat setting is done before bleaching to prevent wrinkles from being set in the kier or J-box.

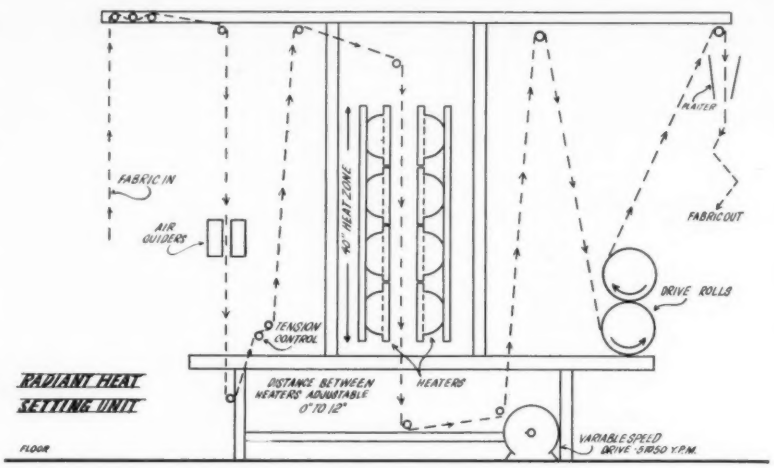


Figure 1

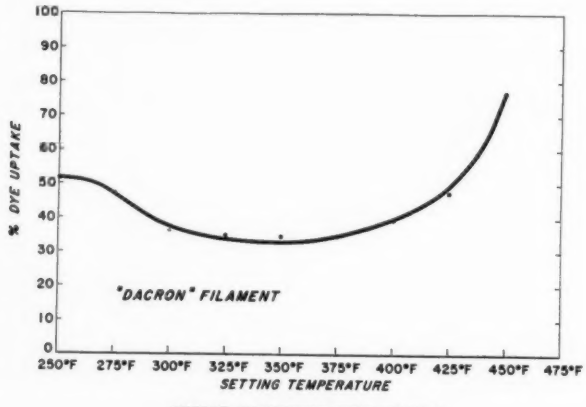
When medium or dark shades are required and bleaching can be omitted, heat setting should be done after dyeing. However, this can lead to shading and over-all shade change at temperatures above 350 degrees Fahrenheit. The development of a thermal shock heat setting technique which utilizes radiant heaters operating at 1200 to 1400 degrees Fahrenheit eliminates dye sublimation and other negatives encountered in conventional heat setting. Figure 1 is a schematic drawing of the radiant heat setting unit. Fabrics set in this unit require only two to four seconds exposure as compared to 90 to 120 seconds for hot air units. The initial investment for this unit is small as compared to other setting machines and the operational costs have proven to be low.

Figures 2 and 3 show the effect of heat setting on fabric stability and on dye up-take.

In Figure 2 it can be seen that heat setting reduces the dyeability in the range from 275 to 390 degrees Fahrenheit. Above 390 degrees Fahrenheit the dyeability sharply increases. Thus, an uneven heat treatment before dyeing can cause dyeability problems and even heat exposure across the fabric must be assured.

In Figure 3 it can be seen that as the setting temperature increases, the per cent shrinkage induced by subjecting the fabric to any given temperature decreases.

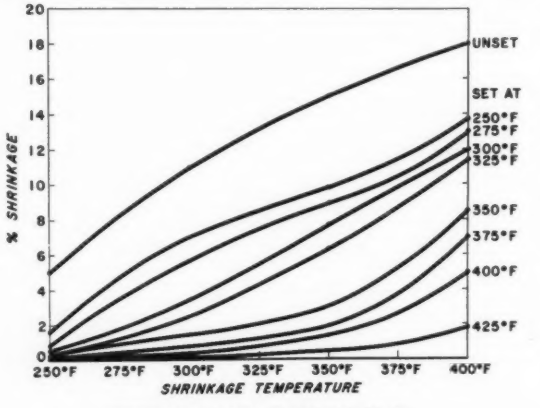
Heat setting does not compensate for the shrinkage of the cotton component and unless fabrics of "Dacron"



EFFECT OF SETTING TEMPERATURE ON DYE UPTAKE

Figure 2

"DACRON" POLYESTER FILAMENT UNRESTRAINED



EFFECT OF SETTING TEMPERATURE ON DIMENSIONAL STABILITY OF FABRICS

Figure 3

polyester fiber and cotton are handled completely relaxed through finishing, about four per cent residual shrinkage will result. Thus the well-known means for controlling shrinkage on all-cotton fabrics are put to work in fabrics of "Dacron" and cotton. These are mercerizing and compressive shrinking. Adequate heat setting combined with mercerizing and compressive shrinkage will produce fabrics with less than one per cent total residual shrinkage after 10 "Sanforized" wash tests. Although very strong caustic is used in mercerizing and "Dacron" is sensitive to caustic, the times and temperatures of exposure are such that fiber strength loss is negligible.

For bleaching, peroxide bleaching procedures will do a satisfactory job on the cotton component of the blend and this is generally all that is necessary. The "Solomatic" process, kier peroxide bleaching, or the two-stage J-box procedure in which the caustic treatments are by-passed and the fabric goes directly into the peroxide saturator at lower than normal temperatures (180 degrees Fahrenheit) are used.

A light chemic bleaching (sodium hypochlorite) following the peroxide bleach will give an improvement in whiteness. Normally the blend is finished with an optical whitener. Peroxide does not bleach "Dacron" polyester fiber and if it is necessary to bleach the "Dacron" as well as the cotton a sodium chlorite bleach using two grams per liter of "Textone" with one-half gram per liter of nitric acid and two grams per liter of oxalic acid produces a satisfactory white on both fibers.

It is interesting to note some special techniques that have found particular application in finishing blends of "Dacron" and cotton. The first one is calendering. Schreiner or plain calendering with 30 tons of pressure at 350 to 375 degrees Fahrenheit prior to heat setting will produce a fabric with better cover, uniformity, and a certain amount of durable luster. The thermoplastic nature of "Dacron" permits the formation of durable pleats on completely finished goods and embossing can be done at 350 degrees Fahrenheit and 30 tons nip pressure to produce durable patterns.

For coloration of fabrics of "Dacron" polyester fiber and cotton we should consider printing, yarn dyeing, and piece dyeing.

We will first discuss printing. Most of the prints produced today on blends of "Dacron" and cotton are made with resin-bonded pigments. These have excellent covering power and are satisfactory for light shades. However, as the depth of shade increases, the wash and crock fastness decrease and heavy shades of navy, brown, and green rarely have enough fastness for wash and wear fabrics.

Vat dyes applied by the conventional potash-sulfoxylate method produce light to medium shades for small designs, but coverage is not sufficient for blotch areas since the "Dacron" is stained but not heavily dyed.

Recently, by the use of the Radiant Heat Unit it has been possible to apply "Latyl" dyes by the thermosol technique. These dyes are printed in conjunction with vat colors and the vat colors are developed by flash aging after the "Latyl" dyes have been thermosoled. By this method, clean sharp prints of excellent fastness are produced, but the brightness is generally not as good as prints on 100 per cent cotton. The printing of fabrics of "Dacron" and cotton by a simple method to give fast bright prints is a problem on which we are working and the industry will be kept informed of our progress.

Yarn dyeing is also being practiced extensively with "Latyl" (disperse) dyes which were specifically developed and manufactured first for application to "Dacron" polyester fiber. Vat dyes are then applied in a second step to the cotton. The disperse dyes for the "Dacron" are preferably applied at 250 degrees Fahrenheit and heavy shades require a scour with one gram per liter each of caustic, "Sitol" oxidizing agent, and a surface active agent to insure good fastness. The "Dacron" can also be dyed at the boil by the usual carrier method. However, such procedures are not as economical as high temperature application and in some cases the dyeings exhibit poorer fastness. In carrier dyeing, a scour is recommended for all shades between the application of the "Latyl" and vat dyes. The production of yarn-dyed fabrics is growing rapidly and it is estimated that one mill alone is producing about 100 combinations in a variety of fabric patterns and constructions.

The remaining method of dyeing is piece dyeing. Fabrics of "Dacron" and cotton can be dyed by either batch or continuous procedures. The method used will depend largely on the equipment available and the depth of shade desired. Regardless of the method, combinations of the recommended disperse dyes for the "Dacron" and vat dyes for the cotton produce dyeings essentially equal to that of vat dyed cotton.

When batch procedures are used at the boil, the "Dacron" polyester fiber is preferably dyed in a beck followed by pad-jig dyeing of the cotton. By so doing, the caustic and reducing agent used in vat dyeing serves as an effective scour for the dyed "Dacron." The cotton can be dyed first, particularly in heavy shades, but precautions need to be taken in adjusting the pH of the bath to activate the carrier. As is the case with yarns, fabrics can also be dyed at 250 degrees Fahrenheit without a carrier in the Barotor or the Burlington Hy-Press Machine. This latter machine is quite useful and economical for fabrics up to nine-ounce weight for relatively short yardages (400 pounds).

Since fabrics of "Dacron" and cotton are very popular and there is every indication that their popularity will increase, it is only natural that serious attention be given to continuous methods of dyeing.

There are two important procedures for dyeing these fabrics continuously—pad-steam and thermosol. Generally, continuous dyeing of fabrics of "Dacron" and cotton falls into three main categories. These are:

1. Pastel Shades—Dye cotton only with vats by pad-steam.

2. Light to Medium Shades—Dye "Dacron" only with disperse ("Latyl") dyes by the thermosol method.

3. Medium to Heavy Shades—Dye both the "Dacron" and cotton by the thermosol and pad-steam or pad-jig procedures.

Where sufficient yardages are involved, pastel shades can be made economically by dyeing only the cotton component with insoluble or soluble vat dyes by continuous processes. Such dyeings exhibit good coverage in well-blended fabrics. As the depth of shade increases, dyeing of the minor component is not sufficient as coverage becomes increasingly poorer. It then becomes necessary to dye the "Dacron" polyester fiber or both components.

The continuous thermosol method by which the "Dacron" can be dyed is very promising and is gaining in popularity. Dyeing of the "Dacron" by the thermosol process consists of padding the fabric blend with a dispersion of the dye, drying, and finally fixing the dye on the "Dacron" by subjecting the fabric to temperatures between 400 and 410 degrees Fahrenheit. Referring again to the radiant heat unit, this has proven to be a very efficient and economical means to thermosol colors on fabrics of "Dacron" and cotton without sublimation

of the dye or yellowing of the cotton. The thermosol process has several distinct advantages over aqueous batch procedures and are as follows:

1. A continuous process — hence, large yardages can be dyed economically.
2. No carrier required.
3. Excellent dye utilization.
4. Fabric processed in open width.
5. Simultaneous dyeing and heat setting.
6. Dyeing not affected by pre-heat setting or singeing.

In summarizing the dyeing and finishing of fabrics of "Dacron" polyester fiber and cotton, we are aware that a preferred sequence may be rearranged to fit into the facilities at a particular mill. When working out a finishing procedure for fabrics of "Dacron" and cotton, the following are important points to keep in mind.

1. Scour before applying heat. The size can be set by singeing or heat setting so as to be difficult to remove. A more efficient singe can be done on clean goods.

2. Heat set before a peroxide kier or J-box bleach. Under conditions of heat and mechanical pressure, wrinkles can be set in the fabric which are difficult to remove. A heat set fabric will not develop these wrinkles permanently.

3. Heat set before singeing. Variations in heat intensity or tension during singeing can cause differences in width-wise shrinkage. These differences would be set in by subsequent heat setting. A heat setting before singeing would stabilize the fabric at constant width.

4. Avoid excessive alkalinity. A standard cotton pressure kier boil will degrade "Dacron." An open peroxide kier or J-box bleach can be safely used if the alkalinity and temperature are kept within limits.

5. Dye "Dacron" polyester fiber before singeing. The melt balls from singeing will dye much darker and give an undesirable appearance when dyeing "Dacron" which has been singed.

6. Use mechanical action before heat setting. As much working of the fabric by scouring and mercerizing before stabilizing with heat will result in more even-looking finished goods.

"ORLON" ACRYLIC FIBER AND COTTON

Let us now turn our attention to blends of "Orlon" and cotton. One question which is bound to occur to everyone is this—"Is there room for fabrics of both 'Dacron' and cotton and 'Orlon' and cotton?" Depending on end-use requirements we believe there is for the following reasons:

1. Hand. "Orlon" and hence blends of 80 per cent "Orlon" and 20 per cent cotton have a very soft kind hand and luxury of hand is a very strong selling point.

2. Comfort. A blend of "Orlon" and cotton with high content of "Orlon" is rated as the most comfortable blend next to the body. It wicks water rapidly, never feels clammy, and dries rapidly.

3. Versatility of fabric constructions. Since pilling is not a major problem with blends of "Orlon" and cotton, fabrics can be made from yarns with low twist multipliers. Challis, flannels, and other surface-finished soft fabrics are naturals for this blend.

4. Coloration. Outstandingly bright, basic colors (produced by "Sevron" dyes) with excellent light fastness can be applied to this blend. One fiber can be dyed and the other left unstained; they can be union dyed or dyed in contrasting shades.

5. Permanent ease of care. Fabrics of "Orlon" acrylic fiber and cotton are not presently being given merchandising support by Du Pont as wash and wear fabrics. They require ironing after washing, but the ironing time and effort involved is only about one-fifth that required for 100 per cent cotton. They are very easy fabrics to press.

6. Neatness retention in wear. Once a properly constructed and finished garment has been pressed, it exhibits excellent neatness retention.

7. Dimensional stability. Garments from properly finished fabrics of "Orlon" and cotton are stable to repeated launderings.

8. Fabric strength. Blends of "Orlon" and cotton do not have the abrasion resistance or tear strength of blends of "Dacron" polyester fiber and cotton, but they are very much superior to resin-treated cotton.

Fabrics of "Orlon" and cotton are finished by tensionless finishing procedures so that all strains woven into the fabric can be relaxed. In addition, tensions applied in various finishing steps which induce various amounts of inherent shrinkage in the fabric must be removed by final tensionless finishing steps. Although "Orlon" acrylic fiber stretches easily under hot-wet conditions, any fabric containing 80 per cent "Orlon" will return to a stable construction, unless completely distorted beyond the elastic limit of the fiber.

The steps involved in finishing fabrics of "Orlon" and cotton are as follows:

1. Singe in gray.

2. Hot calender at 300 degrees Fahrenheit — 30 tons pressure. This step is optional for eliminating reediness.

3. Desize and scour.

4. Bleach "Orlon" and cotton. It is usually necessary to bleach and remove motes from the cotton component of the blend. This can be accomplished by the Du Pont "Solomatic" hydrogen peroxide process or by treating the material for an hour in a beck at 160 degrees Fahrenheit with five grams per liter "Albone" 35 and five grams per liter of sodium silicate (to pH 9.0 to 9.5). This treatment is satisfactory for fabrics that are to be dyed, but for bleached whites a "Textone" nitric acid treatment or a formic acid, detergent, optical whitener, and tinting scour should follow the peroxide bleach. Consequently, bleaching fabrics of "Orlon" and cotton in an 80 to 20 blend is still a batch process which is done in a closed vented beck made of stainless steel. Continuous procedures are being developed in which a modified "Solomatic" process is used to remove the motes and this is followed in tandem by a J-box steaming for one hour after saturation of the fabric with detergent, phosphoric acid, a tint, and optical whitener.

5. Rinse. Add in final rinse a cationic softener. The amount is governed by the hand desired. Use as little as possible to prevent yellowing.

6. Dry relaxed. Air-lay or loop dryer preferred.

7. Steam frame. At air-lay or loop-dry width without tension.

8. Cold calender. This operation softens the goods and is optional.

9. Compressive shrink. Using rubber blanket.

Let us turn our attention now to the coloration of fabrics of "Orlon" acrylic fiber and cotton.

With regard to printing fabrics of "Orlon" and cotton, the degree of success depends upon the uniformity of the blend, the relative percentage of fibers, the fabric construction, the shade and strength of the print, and the pattern. Since "Orlon" will shrink when exposed to high pressure steam, it is advisable to develop the prints under atmospheric steam or to preshrink the goods before printing. This is done by steaming the fabric at 10 pounds per square inch for five minutes.

Laboratory work indicates that the following three processes can be adapted to commercial textile print-

ing.

1. Resin-Bonded Pigments. If these are used, bonding agents must be selected which can be readily cured, and should give as good wash fastness as possible. The fabric is printed and then heated in a relaxed form to cure the resin.

2. "Sevron" Dyes. "Sevron" dyes give wet fastness and light fastness on "Orlon" acrylic fiber that is fully equal to that of vat dyes on cotton. In addition, these "Sevron" dyes give brighter shades on "Orlon" than is possible with any other class of dyes on any other fiber. On blends of "Orlon" and cotton in the 80 to 20 ratio, these dyes give good coverage in light shades and fair unions in medium shades. Full strength prints are unsatisfactory due to frostiness from the cotton portion. Prints of these dyes give 10 to 20 hours Fade-Ometer fastness and good fastness to dry and wet crocking. Attempts are being made to improve the light and wash fastness by better fixation of the cationic dyes on the cotton or by their more complete removal from the cotton in the final scour.

3. Vat Dyes. Selected aqueous "Ponsol" and "Sulfanthrene" dyes can be printed using conventional pastes and procedures to give a full range of light to medium shades on these fabrics.

New techniques involving thermosol printing of fabrics of "Dacron" polyester fiber and cotton are being transferred for use on "Orlon" acrylic fiber and cotton and we have high hopes that the previously referred to infrared heat setting device will prove to be an important tool in printing "Orlon" and cotton.

With regard to yarn dyeing blends of "Orlon" and cotton, most yarn will be dyed in packages or cheeses (there is some skein dyeing) and, when demand increases, on warp beams. In package or cheese dyeing the yarns should be wound to give medium-hard packages as yarns containing a large percentage of "Orlon" tend to relax and lengthen in the bath. For optimum fastness the "Orlon" is dyed first using disperse dyes for light shades and "Sevron" dyes for medium to heavy shades followed by application of vat or direct dyes on the cotton.

In discussing piece dyeing of fabrics of "Orlon" and cotton, we are assuming that "Orlon" is the major component of the blend.

Many of the light weight fabrics of "Orlon" and cotton and "Orlon" and rayon so far developed are adversely affected by too much tension during processing. Consequently, use of jigs is to be avoided at temperatures above 140 degrees Fahrenheit. Too much tension leads to tightening, wrinkling, and poor dimensional stability. Enclosed reels (with an overhead open steam line) or Burlington machines are recommended for batch dyeing such fabrics.

For light union shades disperse dyes and direct dyes can be applied simultaneously from one bath. However, for heavier shades where "Sevron" dyes are applied to the "Orlon" acrylic fiber it is necessary to use a two-bath procedure.

Procedures for continuously dyeing fabrics of "Orlon" and cotton in a full range of shades have been developed. For pastel and light shades on 80 to 20 blends it is necessary to dye only the "Orlon" component and pad-steam ranges using disperse or cationic dyes are used. Selected vat dyes can be used for union dyeing in medium to heavy shades. They are applied by a standard pigment-pad-dry-chemical-pad-steam technique but the oxidation time is increased to at least five minutes. In the majority of blends, dyeing of both fibers is required. Accordingly, the "Orlon" is dyed with cationic dyes by pad-steam techniques and the cotton subsequently dyed by the usual processes for applying vat dyes.

A one-stage technique in which vat dyes are applied to the cotton and cationic dyes to the "Orlon" has been developed. Combinations of vat and cationic dyes are usually not compatible, but by use of certain dispersing agents and a specific order of mixing, compatible stable dispersions have been produced. The inclusion of the vat dyestuffs in the pad liquor permits continuous dyeing of both fibers in a full range of union as well as cross dyed shades. This one-stage process requires subsequent reduction of the vat colors in a Williams unit (or similar equipment in tandem with the steamer). Continuous oxidation, rinsing, scouring, and drying follow as in the conventional sequence of a pad-steam range for cottons.

It is well to remember that after dyeing by continuous or batch processes that the fabric must be finished relaxed; a common procedure is as follows:

1. Rope scour—180 to 200 degrees Fahrenheit.
2. Vacuum extract.
3. Pad with antistat or softener.
4. Dry relaxed—open width.
5. Steam frame.
6. Cold calender.

Before leaving "Orlon" acrylic fiber, it should be pointed out that some very interesting fabrics are coming along based on combinations like a warp of "Dacron" polyester fiber and cotton filled with 100 per cent "Orlon" or a warp of "Dacron" filled with "Orlon" and cotton.

NYLON/COTTON

The combination of nylon in a blend with cotton is based primarily on functionality. Nylon gives increased wear life by adding abrasion resistance and strength. When Du Pont 420 nylon, a new high tenacity staple having an initial modulus similar to that of cotton, is blended with cotton at a minimum level of 25 per cent nylon in the warp yarn, an increase in yarn and fabric strength of up to 25 per cent and an increase in abrasion resistance up to two and one-half times is realized. Blends of Du Pont 420 nylon and cotton are finding rapidly increasing use in denims and twills in addition to use in pocketing, knit wear, and sewing thread. With the trend toward resin-treating all-cotton fabrics, the blending of nylon with the cotton becomes increasingly atractive in that it helps overcome the very large strength and abrasion resistance loss that occurs with crease resistant resin application to cotton. Intimate blends of Du Pont 420 nylon and cotton, where nylon is present at the minimum level of 25 per cent in the warp yarn, are generally processed by the same methods used commercially for 100 per cent cotton fabrics.

In dyeing, pad-steam continuous dyeing processes using vat dyes are preferred. It is usually only necessary to stain the nylon slightly in this type of blend to get a good union with good fastness. The pad-jig method can be used but it may be necessary to top the nylon with disperse dyes during the soaping operation. When the indigo dyeing process is used, the nylon is dyed to about half the depth of the cotton but in a good blend this is enough to produce a saisfactory union.

In other blends of nylon and cotton using a filament nylon warp or in fabrics where nylon comprises a large part of the face of the fabric it is generally necessary to dye the nylon separately to get a good union. The pad-jig method is probably the most economical since the vat dyes can be applied by padding and the nylon dyed with acid dyes after the vat dye is developed.

Automotive fabrics are usually made with filament nylon with nylon

on the face of the fabric. To meet fastness requirements, "Capracyl" dyes and selected acid dyes are used for the nylon and fast-to-light direct dyes for the cotton or rayon. The nylon is usually dyed first followed by direct dyes in the same bath or in a fresh bath.

Care should be taken in bleaching fabrics of nylon and cotton since high temperature alkaline peroxide liquors can cause severe degradation of 100 per cent nylon fabrics. Intimate blended fabrics containing up to 25 per cent nylon are being bleached by continuous alkaline peroxide methods. The cotton which is more absorbent protects the nylon by taking up the major portion of the peroxide. However, each finisher should satisfy himself that the fabric is not being severely degraded.

Kier bleaching with peroxide where the fabric is immersed in the bleach liquor for extended periods at high temperature should not be used. Kier boiling to remove motes followed by cold batching with peroxide generally bleaches the cotton satisfactorily without degradation of the nylon.

Normal cotton hypochlorite bleaching is not harmful to nylon. However, as is the case with peroxide, hypochlorite has little or no bleaching effect on the nylon and in fabrics where nylon makes up a large part of the face of the fabric hypochlorite bleaching should be followed by a treatment with peracetic acid or sodium chlorite to obtain a satisfactory white.

CONCLUSION

We believe that "Dacron" polyester fiber, "Orlon" acrylic fiber, and nylon each add something special in a cotton blend and that each does a job the other two cannot do as well. Accordingly, we fully expect to see continued growth of blends of "Dacron" and cotton, "Orlon" and cotton, and nylon and cotton.

ACKNOWLEDGMENT

The information presented in this paper is based on work and experience of personnel in the Textile Fibers Department and the Organic Chemicals Department, of the Du Pont Company. The author wishes to express his thanks especially to R E Ritter and C F Hoffman who made many helpful suggestions.

A MILD-CURE CATALYST

(*Concluded from page 42*)

wash-wear finish and catalyst to fabric with curing to be delayed until after the manufacture of garments.

The mild-cure catalyst could be ideal for this purpose. The finish could be applied and dried but not cured in the finishing plant. The low-temperature cure with a wide range of time safety would permit even curing of the thick and thin portions of a garment. Thus the garment manufacturer would have greater ease and greater safety than heretofore possible with the standard methods of catalysis.

SUMMARY

This inexpensive mild-cure catalyst is not intended as a general use material for all curing operations. It is intended for use where curing between 250°F and 265°F is needed. Many mills in the knitted fabrics industry present this problem today.

Gentle curing of low strength fabrics is possible.

Speed up of production with temperatures above 265°F is possible but should be approached with caution and worked out with care.

Curing of manufactured garments remains to be worked out.

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DECORATIVE FABRICS

(*Concluded from page 44*)

bath containing inorganic pigments and various stabilizers, followed by drying of the yarn.

"What are the properties of decorative glass fabrics that would induce man to overcome the many technical obstacles and invest huge sums of capital for the creation of a new industry in an extremely competitive field?

The answer is this: decorative glass fabrics have functional and aesthetic features not found in any other fiber.

Specifically Fiberglas fabrics:

1) wash and hang in a matter of minutes—they are the easiest fabric to care for
2) never need ironing———they are wrinkle free and cannot shrink or stretch because they are permanently heat set and have 100% elasticity
3) are rotproof, mildewproof, pestproof
4) provide excellent resistance to fading———100 hours or better
5) will not burn———they are flameproof
6) are dirt and stain resistant.

The fundamental question at this point is: How have fiber glass fabrics been accepted by the consumer?

The answer is a matter of record. In a period of ten years, the production of decorative fabrics woven from glass fibers has risen from less than 500,000 yards to an estimated output of 40,000,000 yards for 1958.

The consumer has clearly demonstrated a preference for glass fibers in decorative fabrics. Creative research and efficient production will assure continued consumer acceptance.

INTERSECTIONAL CONTEST RULES

THE National Intersectional Contest Committee has announced the following rules to be used as a guide by the various sectional committees. They will supercede those published in the AMERICAN DYESTUFF REPORTER, July 14, 1947, and December 25, 1950. In general, only a few changes in the original rules have been made.

Further information may be obtained from the Committee Chairman, Thomas J Gillick Jr, American Felt Co, Glenveille, Conn.

SUBJECT

Any subject may be selected, and it is assumed that it will relate in some manner to textiles. It is obvious that the strategy is to select a subject which satisfies one or all of the requirements which afford an opportunity to win a prize. There are certain limitations such as:

1) A Section should not use as the basis of its paper, work done by some subcommittee of the Technical Committee on Research. A Section may, however, extend or expand some phase of a general research project.
2) The finished paper should represent a contribution by a representative group of members in the Section; however, reasonable participation by invited nonmembers is permissible. Help may be obtained from schools, commercial laboratories, or industry to foster a committee's efforts, but not as a substitute for its own original work; nor may any school, commercial laboratory or industrial establishment claim credit for the work. It must be the property of the committee which presents it.
3) The subject should be of a nature so as not to involve the Association in patent controversy. Patentable processes or ideas should not be used as subject matter of contest papers since, when so used, they become the property of the AATCC.

It is important that committees be formed well in advance to provide sufficient time for carrying out the work. It is suggested that each committee be formed two years in advance of the convention date. If it is found that two Sections have chosen the same subject, the matter is brought to their attention so that they may continue on the same subject or not, as they prefer.

The title of the paper should not be released for publicity until approved by the National Intersectional Contest Chairman. All news releases must be handled through the National Chairman of Publicity.

SPEAKERS

Any member of the Association may serve as a speaker. He need not necessarily be a member of the Section for which he is speaking.

JUDGES

Any member of the Association may be a judge representing a Section. It is felt, however, that the judge should be, if possible, a member of the Section which he represents in order that each Section may be fairly and equally represented in the final judging. It is recommended that an alternate judge also be chosen so that he may carry on in the event that the first-choice judge is unable to complete his duties.

The judge chosen to represent a Section is free to call upon anyone for expert advice, as it is unusual for any one man to be competent in all fields covered by the different papers. The actual rating of the paper, however, is his privilege alone, and a rating sheet will be supplied by the "Chief Justice." The "Chief Justice" is appointed by the National Intersectional Contest Chairman.

RATING OF PAPERS

The papers of each Section are rated by the judges on the following basis:

For originality	30 points max
For scientific value	30 points max
For practical value	30 points max
For presentation	10 points max
Total	100 points

Each judge will rate each paper independently on the above basis. and the paper receiving the highest score will win the Contest. The paper with the next highest score will receive second prize, and the paper with the third highest score will receive third prize.

It is not necessary that a Section consider only subjects which meet all three qualifications of originality, scientific value, and practical value. Seldom can a Section produce a paper of this type. It may possess but one or two of the above features. However, the more nearly it does fulfill these requirements, the higher will be its rating.

A paper is acceptable even if a Section fails to complete the work as planned or its completed project produces only negative results.

The judges must submit a report of their voting to the "Chief Justice" just before the presentation of the Contest Papers. At the close of the Contest the judges then must submit their votes for presentation value.

DETAILS OF THE PAPER

The paper is not restricted as to length, but its actual presentation will be limited to 20 minutes. This means that a condensed version of the paper, emphasizing its high points, will be given at the meeting; the paper will be published in full in the *Proceedings* in the *American Dyestuff Reporter*. Please note that the paper is the property of the Association and is not to be released to any other publication.

An original and 18 copies of the paper must be furnished to the National Intersectional Contest Chairman at least two months before the Contest. These copies will then be distributed to the judges and the National Publicity Chairman. The judges need a full two months to read, review and rate the papers.

The papers should be typewritten, double spaced, using only one side of the sheet and leaving ample margins.

The original copy, which will be used for publication, must comply with the "Notice to Authors of Papers," which appears periodically in the *Proceedings* (cf *Am Dyestuff Reptr* of December 15, 1958, page P904).

EXHIBITS

Any request for exhibits or display features at the Contest should be made known at the time of submitting the copies of the paper to the National Intersectional Contest Chairman.

"THE APPLICATION OF VAT DYES"

Monograph No. 2

American Association of Textile Chemists and Colorists

MONOGRAPH NO. 2, which deals with "The Application of Vat Dyes" was prepared by a board of editors and collaborators in the American Association of Textile Chemists and Colorists. This group represents a complete cross-section of the entire industry so that the text of the Monograph represents information both from laboratory and practical plant standpoints.

The Monograph contains approximately 385 pages with contents of various chapters as follows:

I HISTORY — Natural Indigo and Tyrian Purple; Development of Synthetic Vat Dyestuffs; History of Application of Vat Dyes; The Application of Vat Dyes to Fibers Other Than Cotton.

II PRINCIPLES OF VAT DYE APPLICATION — Types and Forms of Vat Dyes in Commerce; Chemistry of Application; Stripping and Redyeing Faulty Vat Dyeings; Fastness; Print Discharges; Change of Shade in Artificial Light; Dichroic Dyes.

III APPLICATION TO COTTON RAW STOCK — Equipment Used; Methods of Color Application; Typical Examples.

IV APPLICATION TO COTTON SKEINS—Equipment and Methods.

V APPLICATION TO COTTON WARPS—Short Chain Method; Long Chain Warp Dyeing; Continuous Pigment Padding Method.

VI APPLICATION TO COTTON PACKAGES—The Package; Package Dyeing Machines; Chief Factors in Dyeing Packages with Vat Dyestuffs; Dyeing Speed and Levelling Power of Vat Dyes; Dyeing Methods; Oxidation and Finishing; Vat Dyeing on Beams; Illustrative Dyehouse Procedures.

VII APPLICATION TO COTTON PIECE GOODS—History; Jig Methods; Padding Methods; Continuous Methods; Overhead Reel Method; Vat Dyeing of Cotton Narrow Fabrics.

VIII HOSIERY — Application of Colors to Cotton Hosiery; Application of Colors to Mixed-Fiber Hosiery.

IX APPLICATION TO FIBERS OTHER THAN COTTON—Vat Dyeing of Viscose Rayon; Vat Dyeing of Cellulose Acetate; Vat Dyeing of Nylon; Vat Dyeing of Animal Fibers.

X GENERAL PRINCIPLES OF PRINTING — Piece Goods; Forms Other Than Piece Goods.

XI PRINTING — Direct Printing with Vat Dyestuffs; Discharge Printing with Vat Dyestuffs; Goods Dyed After Printing.

XII INDIGO—History and Properties; Various Indigo Vats and their Preparation; Dyeing of Cotton with Indigo; Dyeing of Wool with Indigo; Application of Indigo to Cotton Printing; Indigo Derivatives.

XIII THE USE OF VAT DYES AS PIGMENTS OR IN NONTEXTILE APPLICATIONS — Paper, Rubber, Plastics and Resins; Fireworks; Paints and Lacquers; Resin-Bonded Pigments; Miscellaneous.

XIV LEUCOESTERS OF VAT DYESTUFFS — History and Chemistry; Properties; Application of Leucoesters; Lightfastness of Leucoesters; Relative Cost of Vat and Soluble Vat Dyeing.

XV TABULATION OF VAT DYESTUFFS—Formulae and Properties; Numerical Index; Alphabetical Index; Trade Names of American-Made Vat Dyes.

AUTHOR INDEX

SUBJECT INDEX

From the foregoing, it is seen that this Monograph gives a very comprehensive description of all of the factors involved in the application of vat dyes. In all discussions of application procedure, practical working formulas are given. This publication is of interest to all persons who are either producers or consumers of vat dyes.

The price of "The Application of Vat Dyes" is $5 per copy, postpaid, to members; to nonmembers it is $6 per copy. Quantity discount prices are as follows:

100 Copies	$2.75	each
50 "	3.00	"
25 "	3.25	"
10 "	3.75	"

Please use the order form at the bottom of this page.

George P Paine, Executive Secretary
American Association of Textile Chemists and Colorists
P O Box 28, Lowell, Massachusetts

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Enclosed is my check for $ ..... covering payment of ..... copies of "The Application of Vat Dyes"

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CANDIDATES FOR NATIONAL OFFICE

THE slate of candidates for National office in 1960 for AATCC was announced at the recent Council meeting in Montreal, Canada as follows:

For President: Weldon G Helmus has been nominated to run without opposition for re-election.

For Vice President of the New England Region: J Edward Lynn and W George Parks have been nominated.

For Vice President of the Central Atlantic Region: C T Anderson has been nominated to run without opposition for re-election.

For Vice President of the Southern Region: A Henry Gaede has been nominated to run without opposition.

For Vice President of the Western Region: Joseph H Jones has been nominated to run without opposition.

1959 OLNEY MEDALIST

DR EMERY I VALKO has been named recipient for the 1959 Olney Medal. The AATCC awards the Olney Medal annually for outstanding achievement in the field of textile chemistry, including the development of chemical agents or chemical processes used in the manufacture of textiles, or methods for their evaluation. Its purposes are to encourage and to afford public recognition of such achievements and contributions, and to be a testimonial to Dr Louis Atwell Olney in recognition of his lifetime of devotion and multitudinous contributions to this field.

Dr Valko was born in 1902 in Abony, Hungary and is a U S Citizen. He is married, has one child, and lives in Belmont, Massachusetts.

Dr Valko received his Ph D degree from the University of Vienna, Austria with a major in chemistry. He has been a professor, Division of Chemistry at Lowell Technological Institute since 1958. Prior business experience includes vice president, Research and Development, at Onyx Oil & Chemical Co.; research consultant to chemical, textile, and cosmetic industries; director of research at E F Drew & Co; research chemist at I G Farbenindustrie, Ludwigshafen, Germany; research associate at University of Vienna.

Dr Emery I Valko is a member of AATCC, a Fellow of the New York Academy of Sciences, a Fellow of the Textile Institute (Great Britain), a member of the American Panel of the Textile Institute, a Fellow of the Society of Dyers and Colourists, a member of the Governing Council of the Fiber Society, a member of American Chemical Society, a member of American Oil Chemists' Society, a member of Society of Cosmetic Chemists, a member of American Association of Textile Technology, and was Chairman of the Gordon Research Conference on Textiles in 1958.

Dr Valko has written one book and has been the co-author of two other books in the field of colloid chemistry. He has written six review articles for textbooks or encyclopedias. Dr Valko is the author of 33 technical papers during the span between 1925 and 1958 and holds 42 patents from the United States, Germany, Great Britain, Canada and France.

The AATCC has awarded the Olney Medal to 14 distinguished scientists from 1944 through 1957 as follows: Louis A Olney, Milton Harris, William H Cady, Edward R Schwarz, Harold M Chase, Charles A Seibert, George L Royer, Raymond W Jacoby, Werner von Bergen, Roland E Derby, William D Appel, Miles A Dahlen, Walter J Hamburger and P J Wood.

Membership Applications

RHODE ISLAND SECTION

Senior

Charles J Bolger—Treasurer, T K Webster Co Inc, Fall River, Mass. Sponsors: A Harrison, R T Mullin.

METROPOLITAN SECTION

Senior

Eugene J Steiner—Chemist, Hart Products Co Inc, Jersey City, NJ. Sponsors: M B Hart, S Cohen.

Junior

Lawrence S Boss—Asst president, Brook Chemical Co, Clifton, NJ. Sponsors: A Rotcop, L J Dogin.

William J Urban—Colorist, Sandoz Inc, New York, NY. Sponsors: A W Spencer, H Brown.

Transfer (Student to Associate)

Rahmat Ali—Research & dev, Sandoz Inc, New York, NY.

NIAGARA FRONTIER SECTION

Junior

Peter M Crosby—Chemist, research & dev, National Aniline Div, Allied Chem Corp, Buffalo, NY. Sponsors: F Sievenpiper, E W Clark.

DELAWARE VALLEY SECTION

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Michael J Miller—Tax consultant, Raytex Chem Corp, Allentown, Pa. Sponsors: G Hermann, E A Dolliver.

PIEDMONT SECTION

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Reginald W Biggers—Supv, Weaving & Dyeing section, Tex Lab, American Enka Corp. Sponsors: R M Stribling, H L Reed.

Joseph N LeConte—Professor of Chemistry, East Carolina College, Greenville, NC. Sponsors: L M Vickery, R B Thomas.

Albert M Thorne—Group leader, Applications dev, Celanese Corp of American, Fiber Div, Charlotte, NC. Sponsors: C S Clutz, A F Tesi.

Eugene P Van Kerckhove — Tex chemist, Tennessee Eastman Co, Kingsport, Tenn. Sponsors: J E Hemphill, S E Shepard.

Associate

John F Fowler III, Chemical Sales, Dow Chem Co, Charlotte, NC.

Transfer to Senior

Walter Baumann—Tech rep, National Aniline Div, Allied Chem Corp, Hopewell, Va. Sponsors: W T Haggerty, W H Poisson.

Don C Duggan — Tex chemist, Southern Dyestuff Co, Charlotte, NC. Sponsors: R E Rupp, F V Tribble.

SOUTHEASTERN SECTION

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Harry F Taylor — Supt, Newnan Mills #3 of Mount Vernon Mills Inc, Newnan, Ga, Sponsors: L Tigler, G E Wallace.

MID-WEST SECTION

Senior

Lillian O Lund — Associate home economist in charge of tex res, South Dakota State College, Brookings, South Dakota. Sponsors: S Davison, M M Cooper.

LOWELL TECHNOLOGICAL INSTITUTE

S Soetopo—Student, Lowell Tech Institute, Lowell, Mass. Sponsor: G R Griffin.

UNCLASSIFIED

Erneste A Hanhausen — Chief res chem, Sinclair & Valentine de Mexico, S.A. de C.V. Industrial Vallejo, Mexico, D F.

Elected to Membership

June 4, 1959

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GEORGIA INSTITUTE OF TECHNOLOGY
Pravin T Shah

FOREIGN
Alexandro W Merin
Jorge Estrada

LOCAL SECTION NEWS

WESTERN NEW ENGLAND SECTION

On May 15th, 1959, the Annual Ladies Night of the Western New England Section was held at Rapp's Paradise Inn, Ansonia, Connecticut. The speaker of the evening was Henry E Millson of the American Cyanamid Company who presented a very fine talk on Gemology. Mr Millson had a very fine exhibit of various types of stones. He gave a very dramatic demonstration of fluorescence and phosphorescence of a special collection of stones.

After Mr Millson's talk, a very enjoyable evening of dancing took place until 1:00 A.M.

About 40 members and guests were present.

* * *

The date of the Annual Outing of the WNE Section has been changed from June 12th to June 19th. It will be held at the Wallingford Country Club.

1959 NATIONAL CONVENTION TO FEATURE TOP-FLIGHT RECREATION PROGRAM

MEMBERS and guests attending the 1959 Convention in Washington, DC, October 8-10, will find a full program of recreation and entertainment to round out the technical, historical and cultural aspects of this year's convention. You will hear more of the details in a later report on Entertainment, but for your preliminary planning, you can anticipate a Golf Tournament on Saturday morning, October 10, on the beautiful 18-hole showpiece golf course of the University of Maryland, with prizes being awarded under the handicap system. If you contemplate playing golf, you should check in at the reception desk before 12:00 noon on Friday, October 9th, and receive your starting time on a first come-first served basis. Tournament players competing for prizes will be requested to tee off before 12:00 noon. The course will be open in the afternoon, however, for those who do not desire to participate in the Tournament.

FOOTBALL GAME —— The University of Maryland will host Wake Forest College on Saturday, October 10, at 1:30 PM. John Howard's committee has arranged for a block of excellent seats between the 20- and 40-yard lines for AATCC members at $4.00 each. These tickets must be ordered and paid for prior to September 10. Opportunities will be presented for members to make such reservations at a later date.

Those avid football fans that would like to stay over Sunday to attend the professional football game between the Washington Redskins and the Chicago Cardinals can make plans to see this game. Tickets are $4.50 each and must be ordered and paid for before September 1. Contact John W Howard, National Cotton Council of America, 1200 18th Street, N W, Washington, DC, if you want to reserve a block of seats for either game. The only available seats for the Sunday afternoon game are in the end zone, since season ticket sales have already obligated all sideline seats.

BANQUET ENTERTAINMENT —— The annual banquet will feature not only good food and a minimum of speeches, but top-flight entertainment as well. Mr Howard promises us a real treat in the banquet entertainment program, so start making your plans to attend the 1959 Convention and enjoy the many advantages that are offered in our Capital city.

JOHN W HOWARD
Chairman
Entertainment Committee
1959 AATCC Convention

A R THOMPSON
Publicity Chairman
1959 AATCC Convention

EMPLOYMENT REGISTER

59-1

Education: MS and PhD—Chemistry, Budapest, Hungary.

Experience: 12 years: extensive experience in application of dyestuffs, resins and chemical specialties; experienced also in organic synthesis, in chemistry of cellulose, synthetic fiber, dyestuffs and resins.

Position desired: Research and development in basic organic chemistry or in the field of cellulose, synthetic fibers, dyestuffs, pigments, chemical specialties.

Location: New York, New Jersey, Metropolitan area.

Age 37, Married, Complete resume and references.

59-7

Education: Student—Graduating with degree in Spain (Dyestuffs Chemistry).

Position desired: Change of information: *Textile Printing*, Dyeing, Finishing, etc.

Languages: Spanish, French, English and German.

Location: Anywhere in U S.

Age 27, Single.

59-8

Education: Cranston, R I High School.

Experience: Foreman Colorist and Colorist past nineteen years.

Position desired: General Foreman —Colorist.

Location: Relocate anywhere (Desired—New England).

Age: 55 years of age, Married, References.

CALL FOR NOMINATIONS FOR THE HAROLD C CHAPIN AWARD

THE Harold C Chapin Award may be presented annually, at the National Convention, to a Senior member, of at least twenty years continuous membership, who has contributed outstanding service in enabling the Association to attain the objects for which it was founded.

The selection is to be the unanimous choice of a Committee consisting of one member from each of the four National Regions, to be selected by the Councilors of the respective Region: the President of the Association, ex-officio; and the Executive Secretary serving as Secretary of the Committee without vote. Each Regional member shall serve for four years; except that the four Regional members of the first Committee shall serve one, two, three and four years respectively, the number of years each particular member is to serve to be determined by lot. The Chairman of the Committee shall be the senior member; the senior member to be that elected member whose term first expires. No member shall be re-elected for at least one year following completion of his term.

The membership of the Committee as constituted for 1959 is as follows:

G O Linberg, *Chairman*, N E Region—one year
D W Robinson, Central-Atlantic Region—two years
S Springer, Western Region—three years
A H Gaede, Southern Region—four years
G P Paine, Secretary

The Award shall be in the form of a suitably worded, framed, illuminated scroll.

Members of the Association are requested to submit to the Committee, through the Executive Secretary, the names of those members deserving consideration for the Service Award.

Please address your nominations to:

G P Paine, Executive Secretary
AATCC National Headquarters
P O Box 28
Lowell, Mass.

PROPOSAL TO AMEND CONSTITUTION

IN support of a proposal to amend the Constitution, J A Komninos, original proponent, has submitted the following statement:

"The proposal to limit the term of office of President to a two year term has had spontaneous and very favorable reception in the Metropolitan Section.

"The dividends of more effective, refreshed leadership could be realized. Indirectly, we believe that in making the Presidency more available to people in their prime should increase the ratio of active to passive members at all echelons. Certainly there is a reservoir of talent in the AATCC that would respond to such a move."

The proposal was presented to the 214th Council meeting on April 3, 1959 with the required number of signatures of Senior members, and then referred to the Committee on Constitution and Bylaws. At the 215th Council meeting on May 29, 1959, the Council expressed its approval of the proposed amendment by majority vote:

"The President and each Vice President shall be elected to serve for one year. No person shall serve for more than two years consecutively as President, or for more than three years consecutively as Vice President or as National Councilor."

The proposed amendment is published herewith as required by the Constitution and will be submitted to vote of the entire Senior membership of the Association on ballots mailed with the next ballot issued for election of officers for the Association.

AATCC Calendar

COUNCIL, COUNCIL COMMITTEES, RESEARCH COMMITTEES
Sept 9-11 (Hotel McAlpin, New York, NY); Sept 9—Research Committees; Sept 10—Council Committees, TCR, ECR; Sept 11 (AM)—Council Meeting

NATIONAL CONVENTIONS
Oct 8-10, 1959 (Sheraton Park and Shoreham Hotels, Washington, DC); Oct 6-8, 1960 (Sheraton Hotel, Philadelphia, Pa); September 28-30, 1961 (Buffalo, NY); 1962 (Southern Region)

HUDSON-MOHAWK SECTION
June 26 (Annual outing—Antlers Country Club, Amsterdam, NY)

METROPOLITAN SECTION
June 19 (Outing—North Jersey Country Club, Wayne, NJ)

MID-WEST SECTION
Oct 24 (Bismarck Hotel, Chicago, Ill)

NIAGARA FRONTIER SECTION
Sept 25 (Niagara Falls, Ont, Canada); Dec 11 (Annual business meeting, Buffalo, NY)

NORTHERN NEW ENGLAND SECTION
Sept 18 (Outing—Wachusett Country Club, West Boylston, Mass); Oct 16 (Lexington Inn, Lexington, Mass); Dec 4 (Joint symposium with ASME Textile Engineering Div, Smith House, Cambridge, Mass); Jan 15 (Woodlawn Golf Club, Newton, Mass)

PIEDMONT SECTION
Sept 25-26 (Barringer Hotel, Charlotte, NC)

RHODE ISLAND SECTION
Sept 18 (Management Night); Oct 23 (Prov Eng Soc, Providence, RI); Dec 4 (Annual Meeting—Johnson's Hummocks Grille, Providence, RI)

SOUTH CENTRAL SECTION
June 26-27 (Outing—Riverside Hotel, Gatlinburg, Tenn); Sept 19 (Hotel Patten, Chattanooga, Tenn)

SOUTHEASTERN SECTION
Sept 12 (Ida Cason Callaway Gardens, Pine Mtn, Ga); Dec 5 (Atlanta Athletic Club, Atlanta, Ga)

WESTERN NEW ENGLAND SECTION
June 19 (Outing — Wallingford, Conn); Sept 25 (Blake's Restaurant, Springfield, Mass); Oct 23 (Annual Meeting—Rapp's Restaurant, Shelton, Conn); Dec 4 (Hartford, Conn)

THE EFFECT OF THICKENING AGENTS IN PADDING WITH ULTRASPERSE VAT DYESTUFFS

R. KERN

Sandoz, Ltd, Basle, Switzerland

SUMMARY

IN the continuous dyeing of cotton piece goods, intermediate drying after pigmentation is often accompanied by migration. The use of thickening agents in the padding liquor has been studied as a means of checking migration. The suitability of some representative thickenings and their effect on the pigment dispersion and the dying process have been examined, ultrasperse vat dyes being used for the purpose. In conclusion the possible scope of thickening agents is outlined in pad processes with direct and disperse dyes.

* * *

At the present time nearly all industries are confronted with two major problems—growing competition and rising production costs. Those industries which have to operate on low profit margins and are sensitive to fluctuations in trade are the most critically affected in this way. Among them can be reckoned the textile industry, which in addition is subject to the influences of fashion. In the present paper, however, we are concerned more particularly with dyeing and finishing, which admittedly is only one sector of the textile industry as a whole.

While the textile finisher is expected to be satisfied with an ever smaller profit margin, the costs of labor, power and chemicals continue to rise steadily. Naturally, attempts are being made to cut costs by introducing new methods which allow for economies in power, steam and labor. Two processes which have made considerable headway in recent years are high temperature dyeing, which has been developed chiefly for package dyeing, and continuous piece dyeing. Both processes shorten the dyeing time, so that above a certain level of production there are savings in labor, power and steam. On the other hand, the installation costs are high and the equipment must be kept in fairly constant use to repay itself. This is especially true of a continuous piece dyeing plant, which is not a successful venture unless long yardages can be dyed so that the equipment remains idle as little as possible.

As the title suggests, this paper deals mainly with the continuous dyeing of piece goods. The continuous techniques now in use are suitable chiefly for dyeing vegetable fibers with vat and esterified vat dyes, naphthols, and pigment/binder combinations. In all of these methods the fabric is first impregnated with a solution or dispersion of the dyestuff. In a second operation the dyestuff must be fixed to give a dyeing which can compare in fastness with one produced by conventional methods. The fabric is normally impregnated on the pad, a well-known machine that needs no further description. A prerequisite for satisfactory padding is high and uniform absorbency, and to this end the fabric must be suitably pretreated and evenly dried.

There are several continuous dyeing systems, however, in which the fabric is impregnated more than once, so that intermediate drying is necessary to give it renewed absorbency. This operation can be a source of various difficulties. Taking the vat dyestuffs as an example, I would like to point out the different problems which may arise and discuss possible means of overcoming them.

As is generally known, the differences of affinity between the individual dyestuffs cause the greatest difficulty in padding, because the one with the highest affinity exhausts quicker than the others and leads to uneven ends or "ending." There are several ways of avoiding this. The liquor box can be made as small as possible to allow for rapid liquor replenishment or, in other words, to enable the fabric to pick up practically all the available liquor. Alternatively, the affinity differences can be compensated by correcting the feeding liquor; this is a delicate task which calls for great skill and experience on the part of the dyer.

An obvious solution to the problem was to eliminate the affinity factor and so to preclude these faults. This is easily accomplished with the vat dyestuffs because they possess no affinity in the unreduced state but only when solubilized by reduction. However, the powder and paste brands originally available proved far too coarse and irregular in particle size to provide good pigmentation, and there was no other choice but to work with reduced dyestuffs. The first step was the development of the vat acid process. The vat acids yield extremely fine pigments which are well suited for padding, since they have no, or only slight, affinity for the fiber. Nevertheless, the method is not without pitfalls, and demands wide experience both in the preparation and the application of the products. Furthermore, the choice of colors is limited because not all of the vat dyestuffs form sufficiently stable vat acids.

In the course of time the manufacturers of vat pigments constantly improved their fineness and achieved a high degree of standardization in the particle size, another property which is extremely important for successful pigmentation. These products have made it possible to obtain uniform impregnation by mechanical means on the pad. They also have a rapid rate of reduction, which is important for the pad/steam and the Standfast molten metal processes.

In the pad/steam process, for example, the impregnated fabric is dried to regain its full absorbency. This is necessary to ensure a sufficient pickup of caustic soda and hydrosulfite in the second or "chemical" pad and thus bring about complete reduction on steaming. In certain cases intermediate drying can be omitted, but this method falls outside the scope of the present paper.

PIGMENT MIGRATION

If the cloth is unevenly dried in the drying plant, the remaining water will spread to the more dry portions.

With water alone this is not serious, but if pigment is present, and it is of sufficiently fine particle size, it will migrate with the water. The result will be an uneven dyeing.

We have illustrated pigment migration caused in this way by the following test (Fig 1): A piece of cotton poplin was impregnated on the pad with an aqueous pigment suspension, and then pleated down on a glass plate. It was weighted with a second glass plate so that the folded sides were left free and dried quicker, causing the moisture to spread from the center to the sides. If the pigment migrated, darker streaks were formed where the cloth was folded.

Another assumption was that the migration of the pigment would increase with increasing fineness, and this was confirmed by the following test (Fig 2): The fabric was padded with a dispersion of 100 g/L Viscofil Green 2GL paste. In the first test the average particle size was 17 microns; in the three following tests the particles were of decreasing size, the smallest being of the order of 0.5 micron. Single particles of other sizes were present, but they do not cause interference.

The tests show clearly that the migration of pigment to the quicker drying sites becomes more marked as the fineness is increased. This points on the one hand to the importance of even drying for levelness of shade and on the other to the fact that a smaller particle size has certain disadvantages as well as advantages. If the available drying plant does not provide perfectly even drying, it is therefore necessary to look for other means of obtaining level dyeings.

To prevent pigment migration, various thickening agents of the kind used in print works can be employed. For this purpose they must fulfill the following conditions:

A. The thickening must be easy to prepare and miscible with aqueous dye dispersions.

B. There must be no pigment migration on the fiber under the given drying conditions.

C. The thickening must have no effect or only a minimum effect on the subsequent operations and the final shade.

D. It must not adversely affect the dispersion, ie, there must be no agglomeration of the pigment.

E. The thickening must be easy to wash out, leaving the handle of the goods unimpaired.

A. PREPARATION———A simple method of preparing the solutions is probably an important consideration for most dyers. It should not be necessary to boil the thickening for a long time to render it soluble, because dyehouses do not usually have the equipment needed. Stock solutions should be free-flowing so that they can be stirred straight into the dispersion.

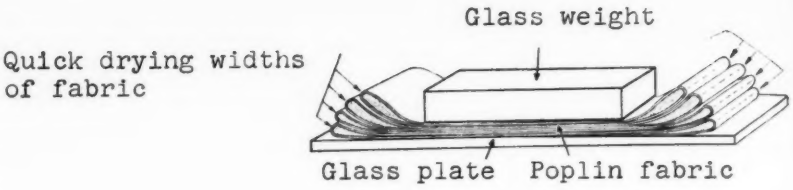


Figure 1

Testing Device Used to Illustrate Migration of Padded Pigment

B. MIGRATION DURING DRYING———It is of course pointless to add to the padding liquor a thickening which does not prevent pigment migration during drying.

We have examined the working properties of the following thickening agents:

1. Sodium alginate
2. Gomalg 80/82
3. Viscarine B
4. Viscarine L
5. Colloresin DKL
6. Carboxy methyl cellulose CML
7. Tragacanth
8. Crystal gum (industrial gum)
9. Meypro Gum CRX

Nos. 1 to 4 are alginates, 5 and 6 cellulose ethers; 8 is a water-solubilized gum arabic, and 9 a modified locust bean gum. Except for tragacanth they are all water-soluble. Tragacanth must be soaked overnight and boiled as it is stirred; this is a drawback on its use in dyeing unless there is a printing shop in the works with suitable equipment.

At constant concentration, solutions of these thickenings were found to vary markedly in viscosity. Values for the relative viscosity at a given concentration have been determined with the aid of a simple apparatus consisting of a glass funnel connected by a short rubber tube to a 1 cc pipette.

The procedure was as follows: 100 cc of the aqueous solution was run into the funnel, and the time taken for the whole of the solution to flow from the pipette was measured. Five tests were carried out at room temperatures (about 18°C) with each solution. The values are averages of these determinations.

From previous tests it was known that 2 g/L Gomalg 80/82 would suffice to prevent migration during drying. Accordingly, the other thickenings were measured in the same concentration. These measurements are given in Table 1.

TABLE 1

Thickening Agent	*Concentration*	*Time of Flow*
Distilled water	—	38.0 secs
Gomalg 80/82	2 g/L	76.8 secs
Viscarine B	2 g/L	123.2 secs
Viscarine L	2 g/L	166.8 secs
Sodium alginate	2 g/L	189.3 secs
Colloresin DKL	2 g/L	47.0 secs
Carboxy methyl cellulose	2 g/L	45.1 secs
Tragacanth	2 g/L	51.1 secs
Crystal gum	2 g/L	38.8 secs
Meypro Gum CRX	2 g/L	50.1 secs

The great differences in the times of flow are a clear indication that the viscosity varies appreciably from thickener to thickener. Except for the alginates, these agents were slightly more viscous than water in 2 g/L concentration.

The times of flow of the thickenings in several other concentrations were measured, and the resulting values were plotted to give curves (Fig 3). From these curves it was possible to determine the concentrations at which the time of flow comes nearest to that of Gomalg 80/82. These concentrations and the corresponding times of flow are set out in Table 2. To ensure good agreement in viscosity the concentrations were corrected, and for further tests the amounts shown in the last column of Table 2 were used. In this way solutions were available which for practical purposes were of uniform viscosity.

TABLE 2

Thickening Agent	*Concentration*	*Time of Flow*	*Corrected Concentration*
Gomalg 80/82	2 g/L	76.8 secs	2 g/L
Viscarine B	1.0 g/L	74.6 secs	1.1 g/L
Viscarine L	0.7 g/L	71.0 secs	0.8 g/L
Sodium alginate	0.7 g/L	76.2 secs	0.7 g/L
Colloresin DKL	4.4 g/L	78.0 secs	4.4 g/L
Carboxy methyl cellulose	7.3 g/L	73.3 secs	7.8 g/L
Tragacanth	4.0 g/L	75.6 secs	4.1 g/L
Crystal gum	50.0 g/L	80.8 secs	47.0 g/L
Meypro Gum CRX	4.5 g/L	80.2 secs	4.3 g/L

Two further tests were conducted, the results of which are shown in Fig 4. Cotton poplin was padded with aqueous dispersions of 10 g/L Sandothrene* Brilliant Green F-NBF powder Ultrasperse, once without thickening, again with 2 g/L of each

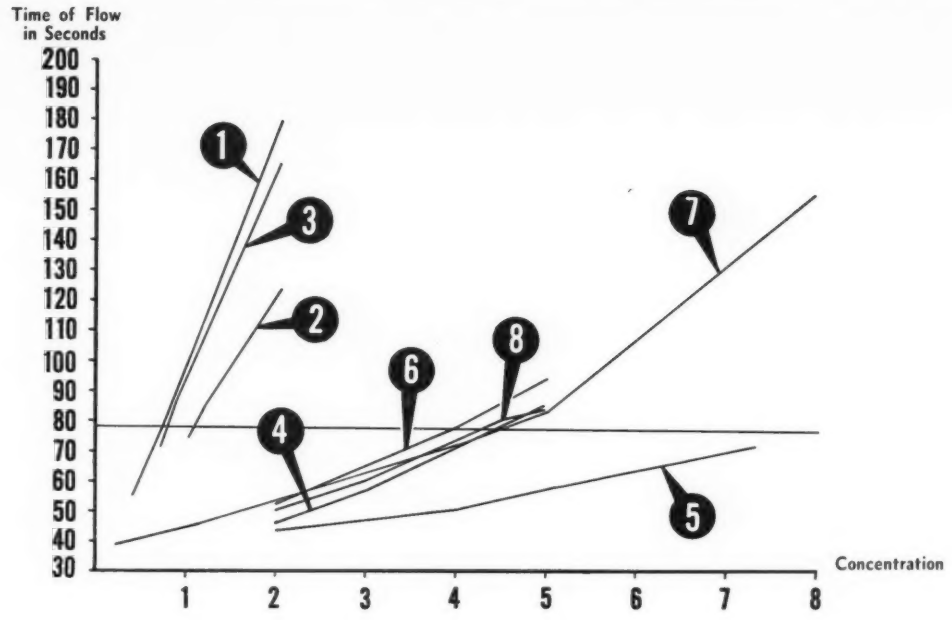


Figure 3

Viscosity of Thickening Agents at Increasing Concentrations

1. Sodium alginate
2. Viscarine B
3. Viscarine L
4. Colloresin DKL
5. Carboxymethyl cellulose
6. Gum tragacanth
7. Crystal gum (gr. × 10)
8. Meypro gum CRX

thickening, and finally with the amounts of thickening determined in the previous test, which give solutions of uniform viscosity. The test fabric was folded and laid out as described above, weighted with a glass plate and allowed to dry. As was expected, all the alginates in 2 g/L concentration gave satisfactory results, no migration being perceptible. The other thickenings of 2 g/L did not prevent pigment migration.

The amounts of thickening indicated by the curves were found to be sufficient in the case of the alginates. With Colloresin DKL and carboxy methyl cellulose these quantities were not enough to prevent migration, and the tragacanth could also be slightly increased to check migration completely. The amounts of crystal gum and Meypro Gum CRX, however, are sufficient to inhibit migration.

With methyl cellulose it was found that even a substantial increase in the concentration does not prevent migration, at least not until the solution is so thick as to be practically unusable. It is therefore evident that, in relation to the total solids content, the alginates are the most effective thickenings. For dyeing purposes this conclusion may be of significance, since it is desirable to introduce as little foreign matter as possible into the dyebath.

C. EFFECT ON DYEING———An essential requirement for every addition to the dyebath is that it should interfere as little as possible with the actual dyeing process, so that the advantages gained by intermediate drying do not have to be paid for by serious disadvantages at a later stage.

In the pad/steam process, for instance, the thickening agent can have several effects. There is a possibility that it may change the shade or slow down the speed of reduction so much that reduction cannot be completed within the short time available.

We have studied the effect of different thickening agents on the shade of a number of vat dyestuffs in ultradisperse powder form. The following products were used:

Sandothrene Yellow NGC
Sandothrene Yellow F-N3RT
Sandothrene Brilliant Orange F-NRK
Sandothrene Red F-N2B
Sandothrene Red F-N4B
Sandothrene Brilliant Green F-NBF
Sandothrene Olive F-N2B
Sandothrene Khaki F-N2G
Sandothrene Grey F-N2GR

These dyestuffs were padded in concentrations of 10 g/L Ultrasperse powder, once without other additions and then successively with the different thickenings. The dyeings were dried in a drying cabinet at about 60°C, which explains why the pieces padded without thickening are rather unlevel in shade. After drying, a sample of each dyeing was vatted in a short bath and finished in the normal way.

The dyeings produced with a thickening agent have been mounted alongside those without thickening; in the first case the pigmented, unreduced fabric and in the second the reduced and soaped fabric are shown (Fig 5). The vertical strips of fabric in both cases are the dyeings produced without thickening.

The most striking fact about the unreduced dyeings is the great differences of shade between those dyed with thickening and the dyeing without thickening. In the reduced dyeings one can see that in most cases those dyed in presence of an alginate vary only slightly in shade from the dyeing without thickening. The greatest difference of shade occurs with Colloresin DKL, this being especially marked with Sandothrene Khaki F-N2G and Sandothrene Grey F-N2GR. Tragacanth and crystal gum appear to give slightly lighter dyeings in a few cases.

The limited scope of these tests does not permit generalizations about the behavior of all vat dyestuffs, though it is probable that the alginates are the least likely to cause shade difficulties. Meypro Gum CRX seems to cause only minor variations of shade.

The next test was devised to ascertain the effect of the thickening agent

on the rate of reduction of the dyestuffs (Fig 6). The test method was as follows: Long narrow strips were cut from each dyeing and hung next to each other on two glass rods. In a glass box, of aquarium size, a blind vat was prepared with 18 cc/L caustic soda 72°Tw and 4 g/L hydrosulfite. The temperature was about 45-50°C. All the dyeings were immersed at the same time and photographed after about 25 seconds in the bath. We are aware that these conditions do not exactly reproduce those of the pad/steam process, for in the latter case the fabric is first impregnated with a cold caustic soda/hydrosulfite solution before entering the steamer, where reduction is effected in 20 to 40 seconds at a temperature of about 102°C. But under these conditions it would of course have been impossible to test all the thickenings simultaneously or to take photographs. Nevertheless we believe that the test does reveal the differences in the rate of reduction.

We have carried out two series of tests. In the first series the dyestuff is illustrated without thickening and with each of the tested thickenings. The illustrated examples are dyeings of:

1. Sandothrene Yellow NGC
2. Sandothrene Yellow F-N3RT
3. Sandothrene Red F-N2B
4. Sandothrene Brilliant Green F-NBF
5. Sandothrene Olive F-N2B

The specimens are arranged from top to bottom in the following order:

Without thickening
Sodium alginate
Gomalg 80/82
Viscarine B
Viscarine L
Colloresin DKL
Carboxy methyl cellulose
Tragacanth
Crystal gum
Meypro Gum CRX

In each case the photographs show that the alginates have hardly any effect on the speed of reduction, whereas Colloresin DKL leads to marked variations. The photographs are also evidence of the fact that with Colloresin DKL the variations in reduction are not always in the same direction. The reduction of the yellows and the red has been accelerated; conversely, the brilliant green has a very slightly slower rate and the olive a slightly slower rate of reduction. If this thickening behaves in the same way in large-scale production there is every likelihood that difficulty will arise when dyeing combination shades. The other thickenings appear to produce some variations in the speed of reduction, though in the majority of cases among those examined the differences are only slight.

In the second series of tests all the dyes were vatted together in the same order as before. In this test the dyeings are arranged according to the thickening. They are shown in the following order:

6. without thickening
7. sodium alginate
8. Gomalg 80/82
9. Colloresin DKL
10. Tragacanth
11. Meypro Gum CRX

In most cases the illustrations do not reveal any appreciable difference from the dyeing without thickening, except with Colloresin DKL and tragacanth. Once again it is apparent that the alginates have the least effect on the speed of reduction.

D. EFFECT ON DISPERSION ———It is crucially important that the thickening should have no influence on the dye dispersion in the padding liquor. If it should cause aggregation the special advantages of pigment fineness are nullified, and the result will be either uneven pigmentation or interference in the rate of reduction.

In order to assess the influence of the different thickenings on the fineness of the vat pigments, solutions of them were prepared, each containing 10 g/L Sandothrene Red F-N2B powder Ultrasperse. Samples of these solutions were mounted on a microscope and photographed at a magnification of 375 (Fig 7). For the sake of simplicity only one alginate was photographed, since it can be assumed that all the alginates have more or less the same effect on the dispersion of the pigment.

From the photographs it is clear at first glance that the alginate has the slightest influence on the dispersion, while Colloresin DKL and crystal gum cause the highest degree of agglomeration. Meypro Gum and tragacanth coarsen the pigment to some extent, but the effect remains within acceptable limits.

E. REMOVAL OF THICKENING ———The importance of easy removal of thickening at the end of the dyeing process is self-evident, for retained thickening may adversely affect the handle of the goods. All the thickenings used in the present series of tests can be washed off without difficulty.

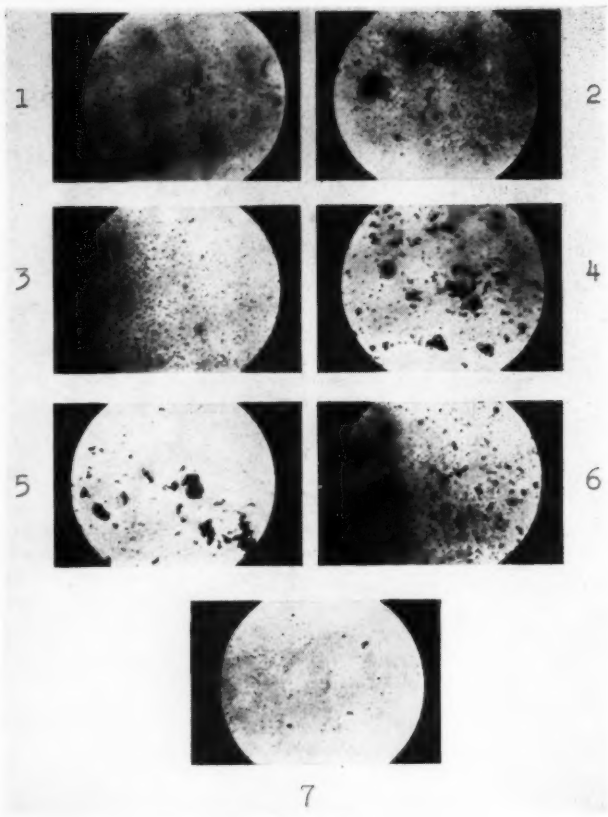


Figure 7
Effect of Thickening Agent on Particle Size
Sandothrene Red F-N2B Powder Ultradisperse
Magnification: 375×

1. 0.7 g/L Sodium alginate
2. 4.1 g/L Gum tragacanth
3. 4.3 g/L Meypro Gum CRX
4. 47.0 g/L Crystal gum
5. 4.4 g/L Colloresin DKL
6. 7.8 g/L Carboxymethyl cellulose
7. Without thickening agent

Fig. 2. Effect of Pigment Fineness on Migration.
Viscofil Green 2GL Paste.

1. 0.5 micron **2.** 2 microns **3.** 5 microns **4.** 17 microns*

* Predominant Particle Size:

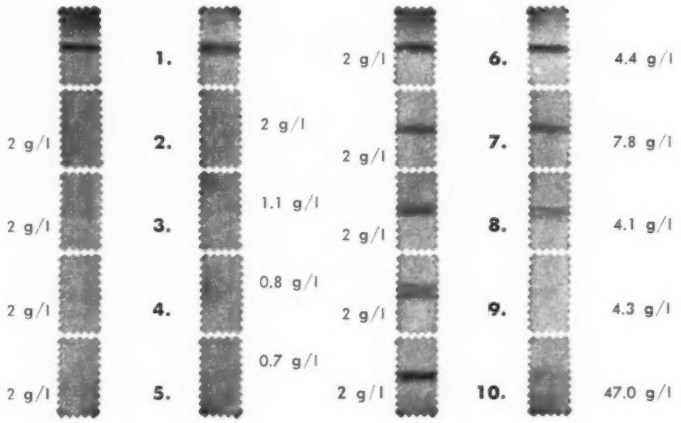
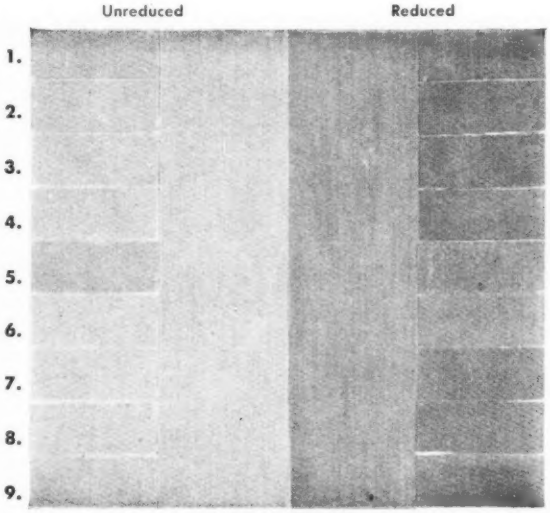


Fig. 4. Effect of Thickening Agent on Migration.
Sandothrene Brilliant Green F-NBF Powder Ultrasperse.

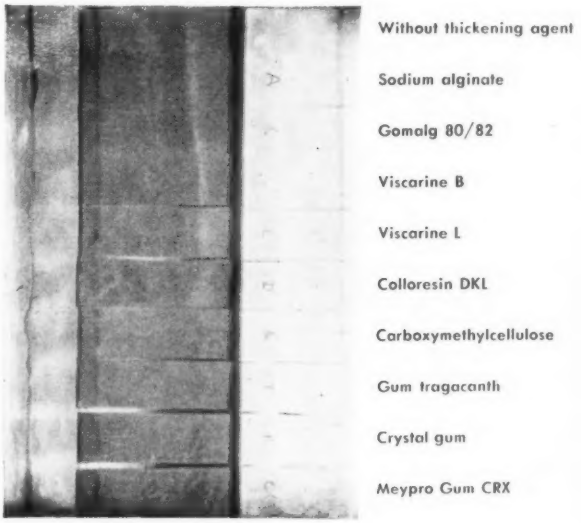
1. Without thickening agent
2. Gomalg 80/82
3. Viscarine B
4. Viscarine L
5. Sodium alginate
6. Colloresin DKL
7. Carboxymethylcellulose
8. Gum tragacanth
9. Meypro gum CRX
10. Crystal gum

Fig. 5. Effect of Thickening Agent on Shade.
Sandothrene Grey F-NGR Powder Ultrasperse.



1. 0.7 g/l Sodium alginate
2. 2.0 g/l Gomalg 80/82
3. 1.1 g/l Viscarine B
4. 0.8 g/l Viscarine L
5. 4.4 g/l Colloresin DKL
6. 7.8 g/l Carboxymethylcellulose
7. 4.1 g/l Gum tragacanth
8. 47.0 g/l Crystal gum
9. 4.3 g/l Meypro gum CRX

Fig. 6. Effect of Thickening Agent on Rate of Reduction.
Sandothrene Khaki F-N2G Powder Ultrasperse.



OTHER USES FOR THICKENING AGENTS

Thickening agents can also be of assistance in the Standfast molten metal process when the material is pre-pigmented and dried and the metal bath is used with a blind vat only. In dyeing with pigments and binders it has been found that thickening agents can prevent pigment migration in the drying operation prior to condensation of the resin. For this purpose the alginates have proved well suited, although the effect of such a thickening on the binder and the handle must also be taken into account. Thickening agents should also prove useful in continuous dyeing with naphthols, for in this process too the material may undergo intermediate drying. However, no trials in this direction have been carried out as yet.

In the case of substantive dyes there is no point in drying the padded fabric, generally speaking, because the following steps do not normally necessitate a second padding. But it has been found that in the Pad-Roll dyeing system, where the cloth is rolled in the wet state and conditioned or "dyed-in" for several hours, an addition of alginate or crystal gum in the padding liquor can lead to very level dyeings. Experimental work with additions of 3 to 6 g/L Gomalg 80/82 and 50 to 100 g/L crystal gum have given very satisfactory results. Nowhere was the fixation of the dye poorer or the fixation time longer than normal. These findings have not yet been verified in practice, however, and refer to laboratory-scale work.

If a hydrophobic fiber like acetate or nylon is impregnated with a dye solution or dispersion on the pad and the shade developed by steaming or conditioning, it can be observed that its hydrophobic nature has made even distribution of the dye virtually impossible. Trial runs with acetate and nylon on the Pad-Roll machine, however, have shown that these fabrics can be satisfactorily impregnated with a suitably thickened liquor. The goods can then be run straight into the "dyeing-in" or conditioning chamber in the normal way, and develop level shades. Of course the liquid must be retained by the fiber as well as the dye, this being an essential condition for good absorption. We have treated disperse dyes on acetate and nylon and acid dyes on nylon. The optimum amount of thickening is governed chiefly by the type of fabric, and no general recommendations can be made. A staple fiber fabric requires less thickening than one of filament yarn. Here also the alginates and crystal gum have given the best results; the necessary amounts vary from 3 to 9 g/L for alginate and 50 to 100 g/L for crystal gum.

I hope my treatment of the subject has been successful in showing the significance of thickening agents in continuous piece dyeing, while at the same time emphasizing the need for caution in their selection. The examples of their application described in this paper refer to laboratory work. In bulk practice some of the factors involved will vary from time to time. Before each fresh application it will be advisable to ascertain the most suitable thickener and the optimum addition by reference to the material, the dyeing equipment and the class of dyes to be used.

Abstracts

Developments in Dyeing and Dyes

McFarlane, R A, *Dyer* 121, 444-7, Mar 13, 1959

During the past year there was a considerable amount of work carried out on dyeing and dyes, particularly the former. Most of the newer fibers can be classed in the difficult dyeing category, and there have been many reports of work carried out on the principles and conditions of dyeing these fibers. High-temperature and carrier dyeing have remained popular subject matter. Following is a partial summary.

Recent literature has stressed that Acrilan is in a plastic condition when immersed in boiling dyebaths, and that cooling down should take place gradually before rinsing off. It is also important to avoid high pressures when package-dyeing in a machine employing a circulatory pump system, and to avoid tension during yarn or piece dyeing. In general, disperse-type dyes are considered to be the best proposition for Acrilan, although for specialized purposes azoic, acid, basic, chrome, metal complex and reactive dyes can be employed effectively.

Ordinary cationic dyes have a high affinity for Orlon 42, but have poor leveling properties, exhaust poorly and penetrate incompletely. A new class of cationic dyes, known as Calcozine Acrylic dyes, are said to have a lower affinity for Orlon and give level dyeings with good exhaustion.

Addition of hydroxylamine sulfate to the dyebath in dyeing acrylic fibers is said to give the fiber affinity for both soluble and insoluble dyes, including acid, direct and metal-complex dyes and the phthalocyanines.

Blacks on continuous-filament Dacron should be produced, it is said, by the simultaneous application of a disperse developed black dye and a developer at a pH of about 6, followed by diazotization.

A study of the stability of acid and chrome dyes at temperatures over 100°C in dyeing nylon showed that many acid and some chrome dyes are suitable for this purpose. High-temperature tests on Terylene with disperse dyes indicated that optimum leveling conditions were obtained at 130-140°C.

Much attention has been given to the reactive dyes, of which there are now quite a number available, namely, the Procions, Cibacrons, and Remazols for dyeing cotton and the Remalans for wool.

Much work has been carried out on the dyeing of triacetate. Carriers have been used to a large extent, and high-temperature dyeing has also been studied.

A process recently reported for dyeing loose wool continuously with milling acid dyes at 100°C in ordinary scouring machines is described.

A method for dyeing solid shades in the piece on carpets of the Axminster or Wilton types has been developed, consisting of padding with thickened dye solution, passing through a slot to remove excess liquor, and steaming.

The Determination of Damage to Wool Fibers

Brown, J C, *J Soc Dyers Col* 75, 11-21, Jan, 1959

One of the most common inquiries received by a technical service department dealing with the wool industry is a request for information

on the amount of modification or damage suffered by a sample. Wool is almost unique among fibers in that its complicated physical and chemical structure renders it susceptible to change when brought into contact with almost any kind of chemical reagent, not excluding distilled water. Many industrial treatments vary in effect according to the previous history of a sample, and the value of some reliable system of measurement of fiber modification is obvious.

In an attempt to classify the various tests for fiber damage, they have been divided into the following broad groups according to the type of chemical or physicochemical modification which they are capable of detecting:

1) *Tests for modification of outer surface structure*
   a) Direct microscopical examination
   b) Sellotape technique (transparent adhesive film, for attaching fibers to slides)
   c) Many staining tests
   d) Allwoerden reaction

2) *Tests for disulfide bond rupture*
   a) percentage swelling test
   b) Urea-bisulfite solubility test.

3) *Tests for main-chain degradation*
   a) Alkali solubility test
   b) Urea-bisulfite solubility test
   c) Krais-Viertel (KMV) test.

4) *Tests for miscellaneous types of damage involving combinations of the above*
   a) Microscopical techniques.

Full details for conducting these tests are given by the author, together with photomicrographs illustrating some of the types of damage.

The swelling of wool fibers in aqueous buffer solutions has been accurately measured, using a centrifuge technique. Rupture of disulfide bonds by alkaline modification has been shown to lead to a rapid increase in percentage swelling, which can be used as a measure of this type of damage. A slight proportional decrease in swelling capacity results from dyeing, and an interesting distinction has been made between neutral-dyeing metal-complex dyes and other types of wool dyes. Chrome dyeings possess greater resistance to alkaline attack than undyed wools.

Nineteen references to the literature are cited.

British Score Gains in Man-Made Fiber Dyeing

Livingstone, F C, *Textile World* **109**, 89, April, 1959

New approaches to the business of getting satisfactory dyeings on the hydrophobic man-made fibers are producing good results for British researchers. The limitations of carrier dyeing, or dyeing under pressure, have stimulated a good deal of work on modifying these fibers after manufacture so that they will be more receptive to dyes.

Bradford Dyers Assoc has found that, by local disturbance of the molecular arrangement of certain fibers, dye absorption can be greatly increased. The process consists of passing a nylon or Dacron fabric between heated rolls, one of which has a pattern engraved in relief. The areas subjected to the heat and pressure absorb dye much more readily than the surrounding areas when the fabric is piece-dyed. Two-tone effects can be created in this way.

Bulked yarns have received attention because long dyeing times and high temperatures spoil the hand and loft of these yarns. One way to improve the dyeing characteristics is to precipitate a more dyeable material on the yarn surface. This sort of substrate can be produced from regenerated cellulose, protein material, or polyvinyl alcohol. Another approach to improved dye receptivity has been to treat the fibers at 150°C in caustic soda dissolved in ethylene glycol.

Acrylic fibers still present problems. Treatments prior to dyeing that are aimed at improving dyeability include adding long-chain quaternary ammonium salts to the dyebath, and pretreating the yarn at 100-200°C with a salt of ethylenediamine and benzene sulfonic acid.

The acrylic fiber molecules themselves are being modified with vinyl monomers, proteins, polyurethanes, etc. Copolymerizing acrylonitrile with amides improves the dye receptivity; also reaction with quaternary ammonium compounds.

It has been found that nylon can be dyed to deep shades with disperse dyes, neutral-dyeing metallized dyes, vats and some azoics if the dyeing temperature is raised above 100°C. Other angles of attack include introducing additional basic groups in the fiber.

The most successful method of getting good union dyeings on Acrilan-wool blends, according to the author, is based on adding a cationic and a nonionic product to the dyebath. The cationic product reacts with the dye to form a complex that is released slowly into solution. The nonionic compound acts to keep the dye completely dispersed.

The Mechanism of the Dyeing of Polyester Fibers with Disperse Dyes

Glenz, O, Beckmann, W and Wunder, W, *J Soc Dyers Col* **75**, 141-7, Mar, 1959

Schuler and Remington found with a few simple disperse dyes on polyester fibers a distribution between fiber and dye solution obeying Henry's law, ie, the equilibrium isotherm is linear up to saturation of the fiber or water with dye. The individual dyes do not then exert much influence on one another. These findings led to the view, still held today, that a solution of the dye in the fiber takes place when these dyes are taken up by polyester fibers.

Waters investigated the saturation values and relative diffusion coefficients of different disperse dyes in polyamide, cellulose acetate and polyester fibers. It was shown that polyester fiber takes up the largest quantities of dyes, but that the dyes diffuse most slowly in this type of fiber.

The conclusion was reached that dye-binding groups must be present. Numerous investigations have also been published on the action of carriers.

Apart from measurements carried out on a single dye or a few dyes at a time, the authors state, there has been no exact study of the physicochemical properties, in conjunction with those which are important for dyeing, eg, dyeing rate, saturation concentration, etc. Moreover, the action of carriers in the aqueous system has not yet been fully explained.

The aim of the work described in the present paper was to examine these questions in greater detail. The results may be summarized as follows:

Measurements of the diffusion coefficients and saturation values of 17 disperse dyes on Dacron polyester fiber under dyeing conditions seem to indicate that the differences in diffusion coefficient between the individual dyes are mainly due, after elimination of geometrical effects, to energy effects associated with the formation of hydrogen bonds, the dye being the proton donor.

The efficiencies of three different carriers (benzoic acid, Levegal PT and trichlorobenzene) were found to be approximately the same if equimolar quantities were present inside the fiber.

The authors state that the effect of the carrier does not depend directly on the type used but on the number of molecules present in the fiber. Thus, the more hydrophobic this substance is, the more suitable it should be as a carrier. In practice, however, the carrier is required to satisfy other conditions, particularly good

dispersion properties and minimum volatility, quite apart from price considerations and possible toxicity. To ensure satisfactory dispersion and to reduce volatility, it is advisable to incorporate hydroxy or other hydrophilic groups in the carrier.

The authors also found that the dyeing rate of disperse dyes on polyester fibers is less dependent on temperature than that on acrylic fibers.

Twelve references to the literature are cited.

Chemical and Physical Effects of Finishing Cotton with Methylol Derivatives of Ethyleneurea

Frick, Jr, J G Kottes, B A and Reid, J D, *Textile Research J* **29**, 314-22, April, 1959

A study has been made of the reactions that occur when methylol derivatives of ethyleneurea, or 2-imidazolidinone, are applied to cotton fabric, and the relation of these reactions to the properties of the finished fabrics.

Various methylol derivatives of ethyleneurea were used in the study of the effect on chemical and physical properties. It has been demonstrated that these methylol derivatives react chemically with cellulose under the influence of acidic catalysts. Metallic salts (eg, zinc nitrate) are most efficient in promoting this reaction. Both monofunctional and difunctional compounds react with the cellulose. The latter, however, cause cross-linkage, which effects marked changes in the physical properties of the treated cotton fabric, particularly wrinkle resistance. Dimethylol ethyleneurea forms cross-links averaging 1.4-1.5 ethyleneurea residues in length. These residues are connected by methylene groups.

The effects of variations in catalyst, composition of the finishing agent, and curing conditions are shown, and relation of the findings to practical finishing is discussed.

The authors point out that, while it is the cross-linking of the cellulose that is responsible for the wrinkle resistance imparted by the finish, this cross-linking also causes a loss in tear strength that is in addition to the loss caused by acid and heat degradation in the finishing process. On the fabric used in this study it was found that about one-half of the total loss (48%) in tear strength was due directly to the cross-linking.

A dimethylol ethyleneurea finish shows little chlorine retention if properly applied. Chlorine retention, however, will be increased if the dimethylol compound reacts less completely (eg, from inefficient catalysis or incomplete curing).

Eight references to the literature are cited.

Printing of Nylon Piece Goods

Anon, *Dyes & Chem Tech Bull* (du Pont) **14**, 173-81, Dec, 1958.

(This article is a revision of previous information that has appeared in the Bulletin.)

Selected acid and direct dyes are widely used in printing nylon piece goods. The printing pastes contain dye, urea, textile gum and ammonium sulfate. The prints are dried and steamed for 1 hour. An alternate method, using solvents (eg, thiodiglycol), for use in rapid aging equipment is also given.

Capracyl and Chromacyl dyes have very good fastness on nylon fabrics. The printing pastes contain dye, urea, Cellosolve and textile gum. The prints are cottage steamed for 1 hour at atmospheric pressure.

Selected vat dyes are easily printed on nylon and have outstanding fastness to washing. The lightfastness, however, is inferior to that on cotton. The prints are rapid aged for 5 minutes and are oxidized with sodium perborate at 160-180°F.

Disperse dyes print well but are seldom used because of poor wetfastness and dull shades on nylon. They require cottage steaming for 1 hour.

Resin-bonded pigments are widely used in printing sheer nylon fabrics. They are usually applied from an emulsion and are fixed by curing.

Suitable dyes of all of the above classes are suggested by the author. In addition, a list of dyes which discharge well on nylon is included.

Plisse or crinkle effects can be produced on nylon fabrics of the proper weight and construction by the following method:

30 parts phenol
20 parts water
50 parts Gum Arabic (50%)

100

The prints are dried moderately, steamed for 5-15 minutes, rinsed, neutralized and soaped.

The Practical Dyeing of Sweaters Made of Orlon Type 42 Acrylic Fiber

Anon, *Dyes & Chem Tech Bull* (du Pont) **15**, 45-55, Mar, 1959.

(This article is an adaptation of an article by J S Thackrah published in *Knitted Outerwear Times* Aug 25, 1958.)

There are several methods for bleaching Orlon. The one most widely used incorporates the use of Textone (sodium chlorite), an acid (eg, oxalic), an optical bleach, and an inhibitor (sodium nitrate) to reduce the fumes of chlorine dioxide. The bleaching is carried out at 190°F for ½ hour, followed by boiling for 15 mins. The bath should be cooled gradually to prevent setting of wrinkles (the same precaution should be taken after dyeing).

For the production of pastel to light and medium shades disperse dyes are generally used. A prescour of the goods is usually desirable; a treatment with Duponol RA and tetrasodium pyrophosphate is recommended. Dyeing is conducted at the boil in a slightly acid bath with addition of 2% TSPP, 1-2% Compound 8-S and 0.25-0.5% Duponol RA.

Cationic dyes are used for producing heavy and brilliant shades. A scour with nonionic agents should precede dyeing. In general, the following products are used in the dyebath: a cationic retarder, sodium sulfate, acetic acid and a nonionic detergent. The cationic retarder controls the rate of exhaust of the dyes and prevents rapid striking of dyes when they are first added. Sodium sulfate promotes transfer and leveling of dyes and also has some retarding action. Acetic acid is used to maintain a pH of 4.5, and improves the stability of these dyes at high temperatures. A nonionic detergent is used to wet out the fiber and emulsify oils left after scouring. The dyeing is started at 140°F, the bath is raised to the boil in 30-40 mins, and is boiled 1-1½ hours.

The amount of retarding agent required to produce level results varies from 8-10% for minimum shades to none at all for heavy dyeings.

Full particulars are given for carrying out the various processes, and a range of suitable dyes is suggested.

Verel in Carpeting.

Langstaff, W I, Dyer, R F and Grossman, J M, *Modern Textiles* **40**, 40-7, 76, Mar, 1959.

The Verel fiber is composed chiefly of acrylonitrile, but certain modifiers have been added to impart whiteness to the fiber as well as flame resistance, optimum moisture regain and greater affinity for dyes.

The Verel carpet staple was developed especially for use in floor coverings. It is stated to be a fiber of adequate but not high strength and moderately high elongation, resistant to mildew and insects, and nonallergenic. It is thermoplastic, will stand exposure to temperatures up to 300°F, but is best processed at 200-250°F. It has excellent weathering properties and is resistant to a wide range of chemicals.

Verel may be dyed by these three general classes: disperse, neutral-

dyeing premetallized, and basic dyes. For carpet use the disperse dyes are preferred. Stock dyeing is recommended, at temperatures of 180-190°F. The fiber is said to have excellent whiteness, making possible bright colors.

Carpets of Verel are being manufactured by both tufting and weaving processes. These carpets have been tested for performance in comparison with similar carpets made of wool and other fibers. The tests are described in great detail.

The Verel carpet was found to resist crushing to a greater degree than the wool carpet, and also retained its texture better than wool, both in service and in cleaning. In soil resistance it is stated to be at least as good as wool. The Verel carpet yarn is said to have higher strength and stretch than wool, and superior elastic recovery.

The new fiber has outstanding cleanability, and in general, spots and stains are easily removed. The wear life of Verel appears to be about equal to that of wool, and is much superior to rayon.

Recent Advances in Wool Finishing

Jones, W H, *Textile Recorder* **76**, 75-6, March, 1959.

The author warns at the outset that the more processing treatments a wool fabric receives, "the further removed it becomes from the strength, quality and handle with which it started its life."

A new mothproofing agent, "Dielmoth" is reported. This is furnished in an emulsion with xylene which contains 20% Dieldrin, the essential constituent, and is applied at the boil from acidic or neutral dyebaths. The effectiveness of this treatment was determined by actual exposure of the fabric to moth larval attack after repeated drycleaning and washing treatments. Apparently it is little affected by drycleaning, although hot solutions of solvents will almost completely remove the Dieldrin. The efficiency is somewhat reduced after 12 soap treatments. (The author adds that the mothproofing compound "Mitin FF" has similar properties and has slightly better washfastness.)

A new permanent creasing process for wool, "Si-Ro-Set", is described. This treatment involves spraying a solution of 3-6% ammonium thioglycolate plus a small amount of wetting and dispersing agents onto the garment; the amount of solution sprayed is usually about 40 percent of the fabric weight. The goods are then folded and pressed on a Hoffman press or in an autoclave for 2-5 mins, and then dried. Since thioglycollic acid is a chelating agent which readily combines with iron, copper, chromium, etc, none of these metals should be allowed to come in contact with the solution or the sprayed goods. If dyes are used which contain small amounts of these metals, a change of shade is produced. The author also warns that the solution is slightly toxic. The treatment is said to withstand boiling water and repeated washings. The chemistry of the action of ammonium thioglycollate on wool is explained by the author.

A new process for giving shrink resistance to wool, entitled "Dylan", is described briefly. Earlier shrinkproofing treatments by acid chlorination removed most of the scales on the wool fiber, and thus damaged the other wool properties. In the Dylan treatment the reaction with the wool fiber is slowed down, so that the scales are not removed but only modified slightly.

The author also refers to shrinkproofing treatments in which resins are used, but points out their adverse effect on the hand of the fabrics when sufficient resin has been applied to prevent shrinkage.

Rhovyl Polyvinyl Chloride Fibers

Hochstaedter, L, *Can Textile J* **76**, 61-2, Feb 6, 1959.

Rhovyl is the name given to various yarns and fibers which are 100% polyvinyl chloride. These fibers are made in France by Society Rhovyl.

There are several types of Rhovyl, all possessing different shrinkage characteristics but still having the same chemical properties, as follows:

	Possible shrinkage at 212°F
Rhovyl 55	55%
Rhovyl 30	30%
Rhovyl 15	15%
Rhovyl T	0

The choice of whether one should use Rhovyl 55 or Rhovyl T depends upon the end product.

The general properties of these fibers include non-inflammability (they melt but do not flame), high resistance to atmospheric and biological destructive agents, and resistance to a wide range of chemicals (eg, 1% hydrofluoric acid, conc nitric acid and caustic soda 36°Be. Prolonged exposure to sunlight has little effect; only Orlon has a comparable resistance.

The three Rhovyl shrinkage fibers have many uses. Three-dimensional fabrics can be made by the use of Rhovyl 55. In Axminster carpets a blended yarn containing 20-30 percent of Rhovyl 55 will give a sculptured effect. The fibers find uses in filter cloths and other industrial applications. Imitation suede fabrics are made by using a blend of 30% Rhovyl 55 and 70% of a nonshrink fiber (eg, viscose staple or nylon), which is knitted and subjected to a finishing treatment including shrinking.

Rhovyl T, the nonshrink type, blended with wool, finds uses in sweaters. These fabrics are said to retain their shape without shrinkage during washing, and are extremely warm. Rhovyl T is also used in underwear. Blends with nylon and viscose are on the market in Europe in clothing fabrics. Skirts may be permanently pleated because of Rhovyl's thermoplasticity.

Due to Rhovyl T's high elongation, it is necessary to avoid high tensions during processing.

Both Rhovyl 55 and Rhovyl T are also available in various dope-dyed colors. The white fibers may be dyed with acetate dyes.

Partially Acetylated (PA) Cotton

Anderson, E V and Cooper, A S, Jr, *Ind & Eng Chem* **51**, 608-14, May, 1959.

Cotton cellulose has reactive groups which make it possible to modify the fiber chemically. The resulting fibers usually have physical and chemical properties vastly different from untreated cotton, but maintain their textile properties and fibrous nature.

The Southern Regional Research Laboratory (SRRL) has done considerable work on many chemically modified cotton fibers, but the one which it has investigated most extensively is partially acetylated (PA) cotton. This has several improved properties over untreated cotton, but the most important are its excellent mildew and rot resistance and its superior heat and scorch resistance.

SRRL developed both a batch and a continuous process for making PA cotton (see *ADR 43*, 203, 1954). Later three U S companies became interested in commercializing these process, and one, the Proctor Electric Co, of Philadelphia, was successful in transferring SRRA's semi-pilot-scale batch process to commercial textile equipment.

In practice it is not necessary to acetylate cotton completely. Substitution of acetyl groups for hydrogen in about one-third of the hydroxyl groups is adequate.

The acetylation process, whether it is batch or continuous, consists of six basic steps: presoaking, cooling,

catalyst addition (perchloric acid), reaction (with acetic anhydride and glacial acetic acid), washing and drying. Full details of the various operations are given by the authors.

Following are some of the advantages claimed for PA cotton in comparison with the untreated fiber:

1) *Heat resistance*: it withstands sustained temperatures up to 320°F, and its service life is increased about 4 times.

2) *Scorch resistance*: it will stand 30 minutes of direct contact with an electric iron at 400°F without appreciable discoloration.

3) *Mildew resistance*: pure culture tests show that PA cotton is completely resistant to mildew attack.

4) *Rot resistance*: in soil burial tests PA cotton retained 90 percent of its original strength after 50 weeks; untreated cotton was destroyed in one week.

5) *Electrical resistance*: dc current insulation resistance is greatly increased.

However, acetylation also adversely affects some desirable characteristics of cotton: it reduces the material's tenacity, flex abrasion, and tear strength, but not enough to hinder its usefulness.

PA cotton, if desired, may be dyed with direct acetate dyes; or alternatively, the cotton may be dyed with vat colors previous to acetylation.

The principal market for PA cotton at present appears to be in the laundry industry (eg, for press cloths, home ironing board covers, etc), owing to its superior heat and scorch resistance.

Eighteen references to the literature and patents are cited. A cost analysis of the acetylation process is included in a separate article following this one.

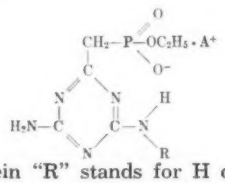
• PATENT DIGEST •

PAUL WENGRAF

ANTISTATIC AGENTS — Anionic guanamine phosphonates G,1

USPat 2,822,364 (Am Cyanamid Co——Schuller ——Feb 4, 1958)

A new class of guanamine phosphonates, characterized as colorless solids which are soluble in polar solvents (methanol, ethanol, propanol), has proven to be useful as antistatic agents for the treatment of nylon, polyester and acrylic fiber fabrics. The products are defined as alkali metal salts of an ethylhydrogen-4-6-diamino-s-triazinyl methyl phosphonic acid, represented by the formula



wherein "R" stands for H or phenyl and "A" for a cation such as Na, K, Li, etc.

These new compounds are prepared by reacting one mol of a diamino chloromethyl-substituted triazine with two or more moles of triethylphosphate. These condensates may further be treated with formaldehyde to obtain the corresponding N-methylolated derivatives.

Example (4): Five pbw of the sodium salt of the above compound are dissolved in 95 pbw isopropanol. A sheet of nylon is immersed in this solution, squeezed and air dried. An electric charge is induced to this fabric by striking it for 15 minutes with a glass rod. Thereafter the sheet is held above carbon particles, spread out over a table. The closer the sheet can be brought to the carbon particles without attracting them, the better the antistatic effect. In this case, practically no attraction whatsoever could be observed, even when the sheet was held a negligible distance from the carbon dust.

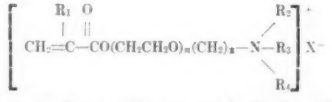
No references are cited by the Patent Office.

ANTISTATIC AGENTS — Polymerized acrylic esters of quaternized ammonium glycol ether derivatives G,1

USPat 2,824,861 (Arnold Hoffman & Co——Conbere, Reid——Feb 25, 1958)

It is stated that none of the numerous antistatic finishes on the market has proven satisfactory, largely because of lack of resistance to wearing or drycleaning. Further difficulties have been experienced in transferring some of the known agents to textiles.

According to the current invention, a solution to this problem has been found with the application of polymeric quaternary compounds containing a polymerizable acrylic ester group and a quaternary ammonium group linked on either side to a glycol or polyethylene glycol chain. The schematic formula for compounds of this type is represented by the following:



wherein R_1 is H or methyl; R_2, R_3 and R_4 are lower alkyls; and X stands for anion; also R_3 and R_4 can be joined with the N atom to form a heterocyclic ring.

A typical example is the methacrylic acid ester of the β- diethylamino ethyl ether of ethylene glycol, quaternized by dimethylsulfate. The monomers so obtained are polymerized by the action of free radical-type catalysts, such as peroxycompounds, and the polymers are applied to textiles and insolubilized after drying by a treatment with any of the known anionic surfactants (soaps, higher alkylsulfates, alkylaryl sulfonates, etc). Preparation of aminoethers as starting materials is described in *J Am Chem Soc 55*, 1066-68 by Headle et al.

Polymers of the above type can be dried to give a semisolid, sticky mass which redissolves in water only with difficulty. Therefore, it is preferable to apply the aqueous syrup itself to textiles without previously drying.

Example: The aqueous solution of the polymeric N-methyl methyl sulfate of the methacrylate ester of β-diethyl-aminoethyl ether of ethylene glycol is diluted to a solid content of 0.33% of the polymer and heated to 60° C. A nylon fabric is padded in this solution and squeezed to a wet pick-up of 80%, frame-dried at 80° C for 10 minutes, then rinsed with a one percent solution of Na-oleyl-sulfate to retain a slightly lesser amount of the surfactant than of the polymer. After being frame-dried again at 80° C the specimen was found to be antistatic, retaining this property after laundering. An analogous effect has been observed in the treatment of other fibrous materials, which are apt to accumulate static electricity.

Among the references cited by the Patent Office:

USPat 2,693,430 (Gen Aniline/1954) describes a water repellent process featuring a treatment with quaternary nitrogen compounds, eg, pyridinium compounds, linked to high alkylphenols by ethoxygroups. [Cf *Am Dyestuff Reptr 41*, 349 (1956)].

USPat 2,694,688 (DuPont/1954):

antistatic treatment with a water-soluble polymer of a quaternary salt of an acryl oxyalkyl trialkylamine. [Cf *Am Dyestuff Reptr 41,* 349 (1956)].

USPat 2,723,246 (DuPont/1955): quaternary ammonium salts substituted by one or more unsaturated chains plus a dispersant (sodium hexadecenylsulfate) as antistatic agents.

HYDROPHOBING WITH ORGANOHALOGEN SILANES present in gaseous mixtures G,2,02

USPat 2,824,778 (E Robbart——Feb 25, 1958)

Degradation and loss of strength of fibers occur frequently in the water-repellent process based on halogenosilane treatment. According to the current invention, this drawback is avoided by exposing cellulosic materials to a gaseous mixture of halogen-substituted silanes in vapor form. The silane is present in the gaseous mixture as an aerosol to assure constant saturation with silane vapors. Provided this process is carried out under suitable time and temperature conditions, the reaction between silane and textile material proceeds continuously and uniformly while side reactions which caused the degradations observed in the past are avoided. After the treatment, *immediate neutralization* of any acidic reaction by-products is required.

Products termed "silanes" in this specification are methylchlorosilanes, such as dimethyl dichlorosilane . . . $(CH_3)_2Si\ Cl_2$ . . . and other compounds of this group (see col 2, lines 24-44). A preferred product is the commercially available mixture of methyl trichlorosilane and dimethyl dichlorosilane (Gen Electric's "Dry Film"). Generally, alkylchlorosilanes which have two or more chlorine atoms and form polymeric chains of silicones upon hydrolyzation are preferred.

Neutralization, carried out immediately or at least shortly after the silane treatment, is essential. Neutralizing agents of mild alkalinity buffered at pH 7-11, such as sodium carbonate, sodium bicarbonate, disodium phosphate, etc, have to be employed. Strongly basic solutions of a pH above 11 (NaOH) tend to remove the silicones formed in the treatment. Fabrics conditioned in an atmosphere of about 50% RH are exposed to the silane aerosol atmosphere, then removed and neutralized, eg, by conc bicarbonate which optionally may contain a nonionic wetting agent, such as Triton X 100.

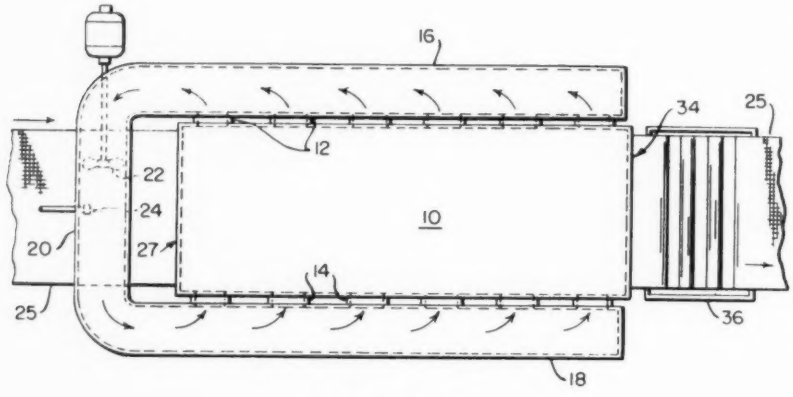
Time and temperature of the reaction are interdependent. At about 100° F, the time of exposure should be less than 10-15 seconds; at normal temperatures (70-100° F), best results have been observed with exposure times between one and sixty seconds.

A device for treating textiles, according to the patented method, calls for a chamber (10), fitted with ports (12,14) on each side of the wall and surrounded by a U-shaped duct (16) that connects with ports (12,14). A section of this duct (20) contains a fan (22) and a spray injector (24) for introducing the silane under pressure and atomizing it into aerosol-size particles. Fabric (25) passes through chamber (10), entering at (25) and leaving at (34), running through neutralizing tank (36). Complete uniformity reportedly is attained as the silane is distributed to every part of the material under practically constant concentrations.

Among the references cited by the Patent Office:

USPat 2,306,222 (Gen Electric /1942): hydrophobing with organosilicone vapors.

USPat 2,474,704 (Dow Corning /1949): hydrophobing with vapors of monomethyldiethoxy silane.



U S Pat 2,824,778

CREASE- AND SHRINKPROOFING————Esters of P-containing acids and epoxyalcohols G,2,04

USPat 2,826,592 (Shell Development Co——Mueller et al——March 11, 1958)

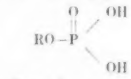
The object of the present patent is to provide a new class of condensates useful for imparting shrink- or creaseproofing effects, while avoiding the discoloration and chlorine retention which frequently occur when urea- or melamine-formaldehyde resins are applied.

The new compounds, which reportedly impart these effects without rendering the fabrics harsh or stiff, may be characterized as ester-type compounds of

a) a phosphoric acid (o-, pyrophosphoric acid, etc) or a phosphoric acid monoester leaving two OH-groups free for further esterification; and

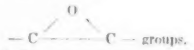
b) two (or three) alcohols containing epoxy groups.

Phosphoric acids are esterified with three epoxy-alkyl groups while monoesters of the type



are combined with two of the epoxy-alkyl groups. "R", in this case, stands for any alkyl group above C_3 or for an unsaturated chain, such as allyl or methallyl residue. In the latter event, improved resinous condensates may result.

The epoxy-substituted alcohols contain one or more

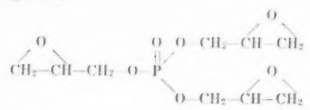


Examples of these compounds are 2-3 epoxypropanol (glycidol) and preferably epoxyalkanols containing three to eight C atoms having the epoxy group in terminal position (see col 5, lines 13-70). Higher epoxy alcohols (eg, 8-9 epoxy octadecanol) additionally give water-repellent finishes. Phosphoric acid esters containing three of the epoxyalkyl groups are obtained accordingly by reacting $POCl_3$ with three mols of the epoxy-alcohols; for example, tri (2-3 epoxypropyl) phosphate (cf col 11, lines 24-28).

Esters formed by reacting "a" with "b" are applied in form of a solution or a dispersion. The emulsifying agent has to be free of nitrogen and/or strong acidic groups. Hardening or curing agents of the acidic type must be added to the epoxy ester solution just before application. Thereafter the goods are dried at temperatures up to 120° C and cured for a short time (one to 10 minutes) at 130-190° C. A great number of appropriate curing agents is indicated in col 9,

lines 27-59.

Example: Tri (2-3 epoxypropyl) phosphate



(see above) was emulsified with Pluronic F-68 and padded on a cotton gingham cloth, then passed through a bath containing zinc fluoborate (catalyst), dried at 100°C and cured at 160°C, finally soaped and rinsed. Softness, good wrinkle resistance, good washability and improved flame resistance were observed, while no chlorine retention could be noted.

Among the references cited by the Patent Office:

USPat 2,524,432 (Du Pont /1950): unsaturated acid esters of epoxy alcohols, eg, epoxypropyl methacrylate, may be polymerized and used among other things for stabilizing normally unstable polymers, eg, polyvinylchloride, against degradation.

USPat 2,584,114 (Secy Agric/1952) covers the creaseproofing of cellulosic textiles by first transforming cellulose partly into carboxymethcellulose or phosphorylated derivatives, then treating the fabrics with polymerizable urea- or melamine-formaldehyde condensates without adding an acidic catalyst.

• BOOK REVIEWS •

LANGE'S HANDBOOK OF CHEMISTRY—9th ED

Handbook Publishers, Inc
Sandusky, Ohio
1985 pages; $8.50
5⅜" x 7¾"

Lange's Handbook is advertised as "The best in its field because it is edited and compiled by chemists for chemists" and there is nothing that this reviewer can say against this claim. Every chemist has used this book in its previous editions and knows full well its strong points. To the organic chemist, the Beilstein references and the hundreds of synonyms at the bottom of the pages are invaluable and appear in no other handbook.

Since practically all chemists are familiar with the previous editions of this book, it would be most advantageous to dwell on the things that appear in this edition for the first time. This list includes: Physical properties of the earth and its atmosphere; cosmic abundance of chemical elements; terrestrial abundance of shortlived isotopes; occurrence of elements in the human body; properties of plastics as materials of construction; properties of plain carbon and low alloy steel; properties of nonferrous alloys; properties of sodium-potassium alloys; solders and fluxes; polarography; activity coefficients of ions; drying agents; relative humidities and aqueous tensions of sulfuric acid, sodium hydroxide and calcium chloride solutions; specific heat standards; luminescence; arithmetic and logarithmic photo-exposure index; fundamental constants for physical chemistry; viscosity comparison chart; hydrometer scales comparisons.

Tables completely rewritten for this edition are: Description of the elements; abundance of the elements; physical constants of the elements; nuclides (isotopes); hormones; corrosion- and heat-resistant alloys; calibration tables for thermocouples; electrometric determination of pH; organic reagents for analysis; densities and specific gravity of aqueous solutions; dielectric constants; solutions for maintaining constant humidity; vapor pressures of substances; critical constants of gases; probable values of the physical constant; viscosity conversion table.

Another unique feature of this handbook is the hundreds of changes scattered throughout the book to keep values of melting and boiling points, solubilities, densities, etc, up-to-date.

All in all, the new ninth edition is a larger and more useful book than previous editions.—RJK.

HETEROCYCLIC COMPOUNDS. VOL 5—FIVE-MEMBERED HETEROCYCLES CONTAINING TWO HETERO ATOMS AND THEIR BENZO DERIVATIVES

Robert C Elderfield, editor
John Wiley & Sons, Inc
440 Fourth Ave, New York 16, NY
vi + 744 pages; 16 × 23.5 cm; $20.00
(1957)

Volume 5 in the series of "Heterocyclic Compounds" deals with five-membered heterocycles containing two hetero atoms and their benzo derivatives. The eight chapters cover: 1,3 Dioxolane and Derivatives (44 pages), Pyrazoles and Related Compounds (116 pages), Indazoles (31 pages), Imidazoles and Condensed Imidazoles (103 pages), Oxazole and Its Derivatives (129 pages), Benzoxazoles and Related Systems (33 pages), Isoxazoles (31 pages), and Thiazoles and Benzothiazoles (238 pages).

A table of contents heads each main topic and extensive literature citations including the patent literature are found throughout each chapter. The synthesis, physical and chemical properties, and utility as intermediates are discussed for each of the major classes of heterocyclic compounds. Of particular interest to the dye chemist are the sections on pyrazolone dyes (6 pages) and cyanine dyes (9 pages).

Dr Elderfield and his coworkers at the University of Michigan are to be complimented on making this contribution to the chemistry of the heterocyclic compounds. This book is highly recommended as an addition to the library of heterocyclic chemistry.—RMP.

HETEROCYCLIC COMPOUNDS. VOL 6—SIX-MEMBERED HETEROCYCLES CONTAINING TWO HETERO ATOMS AND THEIR BENZO DERIVATIVES

Robert C Elderfield, editor
John Wiley and Sons, Inc
440 Fourth Ave, New York 16, NY
vi + 753 pages; 16 × 23.5 cm; $25.00
(1957)

In this latest volume of the Elderfield series on Heterocyclic compounds the same high standards have been maintained as in the preceding volumes. Volume 6 discusses the following topics: The Chemistry of the Monocyclic Dioxanes, by Kremer and Rochen; Benzodioxanes, by Elderfield; Sulfur Analogs of the Dioxanes, by Elderfield; Pyridazines and Cinnolines and Related Compounds, by Jacobs; Phthalazine and Its Derivatives, by Elderfield and Wythe; Pyrimidine and Its Derivatives, by Kenner and Todd; The Chemistry of Quinazoline, by Williamson; The Pyrazines and Piperazines and The Quinoxalines, by Pratt; The Monocyclic Oxazines, by Cromwell; The Benzoxazines, by Elderfield, Todd and Gerber; Thiazines and Benzothiazines, by Elderfield and Harris; and Phenazines, Phenoxazines, and Phenothiazines, by Pearson.

The book is written in clear, concise, up-to-date terminology. Individual chapter indexes and literature references through 1955 greatly aid in utilization of the text.

Of particular interest to the dye chemist are the numerous references to organic dyes. For example, the phenazine, phenothiazine and quinazoline classes of dyes are discussed.

This book is highly recommended for chemists working in the field of heterocycles or those related thereto.—RMP.

• NAMES IN THE NEWS •

Four New Orleans scientists received the U S Department of Agriculture Superior Service Award for their achievements in research on cotton. They are **Miss Mary I Rollins, John J Brown, Louis A Fiori, and Verne W Tripp.** All four are members of the research staff of the Southern Utilization Research and Development Division, with headquarters at the Southern Regional Research Laboratory in New Orleans.

Miss Rollins and Mr Tripp were honored for their accomplishments in the study of the structure and chemistry of the cotton fiber leading, according to the citation, "to improved textile processing through the development of significant basic knowledge of the microscopic and submicroscopic structure and behavior of cotton."

Mr Brown and Mr Fiori have been cited for developments in textile engineering research "resulting in increased utilization of cotton through the recognition and application of fiber fineness in improving product quality, processing efficiency, and merchandising practices."

The awards were presented May 26 at the annual USDA award ceremony in the Sylvan Theater, Washington, D C.

Messrs Brown and Fiori are credited with a major contribution to textile manufacturing through their demonstration that fineness of cotton fibers controls both yarn quality and spinning efficiency. Fineness is now a recognized quality criterion for cotton delivered on future contracts on both the New Orleans and New York Cotton Exchanges. It is estimated that about 90% of the domestic cotton crop is marketed and utilized on the basis of fiber fineness specifications. The knowledge has been utilized in the development of better processing methods, and has shown how unusually fine or immature cottons can be used in the manufacture of fabric of acceptable quality. As a result, the market for this type of cotton has been greatly improved.

Miss Rollins and Mr Tripp are specialists in the use of light and electron microscopes for the study of the structure of the cotton fiber. They have developed a number of special techniques for use of these instruments in studies of the surface, the walls, and interior of the fiber. Information of this kind is basic to improvements in the manufacture of cotton into textiles, and in the development of special purpose fabrics such as wash and wear, flame resistant, oil and water repellent, and other cotton fabrics produced by chemical treatment.

Verne W Tripp, Louis A Fiori, Mary I Rollins and John J Brown

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National Starch and Chemical Corporation has announced relocations affecting two of its Textile starch sales representatives. They are **Edward Maslanka,** who has been reassigned from New England to the company's Southeastern Division, and **Joseph J Ducharme,** who has moved from the West Coast to take over accounts and territory previously serviced by Maslanka. Mr Maslanka, who will now be handling textile accounts in the Southern part of the country, has been with the company since 1947. Starting as a textile chemist, he was transferred to New England textile sales in 1948. He graduated from Lowell Technological Institute in 1940 with a B S degree in textile chemistry. Mr Ducharme will come to his new assignment from work in the company's West Coast Division. Upon graduation from Lowell Technological Institute in 1951 as a textile chemist, he joined the textile development group of National Starch. He has been located at San Francisco since 1953.

F Estes Smith, Grosse Ile, Michigan, has been named American representative of and consultant of Chas Page & Co, Ltd London, England, the largest merchant chemical house in the United Kingdom. Mr Smith, former assistant to the president of Wyandotte Chemicals Corporation, also is president of Knox Crutchfield, Inc, of Port Republic, Virginia. A chemical engineer, he has been active in the industry for years with Allied Chemical, National Carbon Corporation and Wyandotte. During World War II he was in charge of the Chemical Warfare Service manufacturing plants in Niagara Falls, New York, and Monsanto, Illinois, before commanding a 4.2 mortar battalion. His offices will be in Grosse Ile, a community on the Detroit River between Detroit and Lake Erie.

Edward C McCusker has been made plant manager of the Jonell Chemical Corporation's dyeing and finishing plant at East Taunton, Mass.

James L Taylor has been appointed director of the A French Textile School at the Georgia Institute of Technology. For the past year he has served as acting director of the School.

Scher Bros, Clifton NJ, has added two new representatives to its sales force.

Robert E Simons Sr will represent the firm in New England, while **Harry H Sims** will represent Scher Bros in the southern territory.

Silicones Division, Union Carbide Corporation, announces the appointment of **M A Lynch, Jr,** as product manager, textile products.

Dr Lynch received his B S degree at Boston College in 1943, then enlisted in the United States Army Air Force, serving as a weather officer in the North Atlantic. After the war he resumed his chemical studies at Massachusetts Institute of Technology, receiving his Ph.D. degree in 1949.

He then joined Linde Company, Division of Union Carbide Corporation, at its laboratories in Tonawanda, N Y, doing inorganic and organometallic research. In 1956 he was transferred to Silicones Division as manager for market development in the Eastern region, with headquarters in New York City. In 1958 he was transferred to the general office in New York City, specializing in work in textile softeners, finishes, and water repellents.

Dr Lynch is a member of the American Chemical Society and of the American Association of Textile Chemists and Colorists.

Frederick W Wolff, manager of the intermediates section of Du Pont's Dyes and Chemicals Division since 1934, retired from the company at the end of April after a 43-year career.

Joining Du Pont in 1916 as a chemist at the company's Hopewell, Va, laboratories, he was named a sales correspondent in the New York offices in 1919, becoming chief clerk in 1920. He was a salesman in the New York office from 1921 until 1923 when he was named sales manager of intermediates and rubber chemicals in Wilmington, Del. In 1934 he was appointed sales manager of the intermediates section and continued in that position until February 1959, when, pending his retirement, he was named special assistant in the section.

Born April 8, 1894, in New Brunswick, N. J., he attended Rutgers University. He is a member of Pi Kappa Alpha fraternity, Wilmington Country Club, Skytop Club, the Chemists Club of New York, and the Masonic Order. He has been active in the American Chemical Society, the Synthetic Organic Chemical Manufacturers Association, Chemical Specialties Manufacturers Association, and the Compressed Gas Association.

The promotion of **Dr Charles G Goebel** to the position of Research Director of Emery Industries, Inc., has been announced by R W Van Tuyle, Vice President of Manufacturing, Research and Development.

Goebel

Zilch

Barrett

Oehlschlaeger

Wise

Muckerheide

Other promotions of research personnel announced are:

Victor J Muckerheide to Technical Coordinator; **Dr Karl T Zilch** to succeed Mr Muckerheide as Manager of the Process Research Section; **Dr Louis M Wise** to Manager of the Sanitone Research Section; and **Dr H Fred Oehlschlaeger** and **Dr Fred O Barrett** as Managers, respectively, of the newly created Derivatives Research Section and Polymerization Research Section, dividing the activities of the former Organic Chemicals Research Section.

Emery Industries, Inc, has headquarters at Cincinnati, Ohio.

Cameron A Baker of the United States Testing Co, Inc of Hoboken, N J and **Sumner H Williams** of General Aniline and Film Corporation of New York, N Y were made honorary members of Phi Psi Fraternity at the Annual Meeting of the Group in Atlanta, Ga recently. Mr. Williams is Vice President and Assistant Manager of General Aniline and Film Corporation. Mr Baker is Manager of the Textile Research Department of the Testing Company and President of the American Association for Textile Technology.

The degrees were administered by **George Long** of Wallace and Tiernan, Belleville, N J. Mr Long is the retiring president of Phi Psi Fraternity.

Alexander C Sutherland, for the last eight years a salesman in the Chicago district office of Du Pont's Dyes and Chemicals Division, has been assigned to the Philadelphia district office, while **William W Graham** moves from laboratory group leader to salesman in the division's Chicago district.

Francis R Desmond, for the last 12 years a technical demonstrator attached to the division's Technical Laboratory at Deepwater Point, N J, will be assigned to the New England district as a demonstrator for both that sales area and the New York district.

All three men began their Du Pont careers at the Dyes and Chemical Division's Technical Laboratory, Mr Graham in 1941 and the others in 1947. Mr Sutherland, a graduate of Clemson College, was assigned to the division's Atlanta district office sa a technical demonstrator and salesman from 1949 until late in 1951 when he became a salesman in the Chicago district, while Mr Graham has been assigned to the Chicago office since 1953 as laboratory group leader and demonstrator.

A V Baracani of Highland Park, Ill, has joined the Dewey and Almy Chemical Division, W R Grace & Co, as organic chemicals sales representative in Chicago, according to Charles E Brookes, organic chemicals sales manager. Mr Baracani will sell Dewey and Almy's vinyl acetate polymers and copolymers, butadiene-styrene resins and latices, plasticizers, and dispersing agents in Illinois, Indiana, Iowa, Missouri and Nebraska. He was most recently with Advance Solvents and Chemical Division of Carlisle Chemical Works, Inc, and has also served with the Carl Lechner Co and Nox-Rust Chemical Corp. He received a B S in Physics from Lake Forest College in 1949. He lives at 778 Llewellyn Avenue, Highland Park.

Appointment of **John C Holmes** as West Coast sales representative to the textile and leather industries has been announced by the chemical division of Minnesota Mining & Manufacturing

Co. Mr Holmes, who will headquarter at 3M's Los Angeles branch office, will be engaged in promoting and selling Scotchgard Brand stain repeller to the textile industry and Scotchgard Brand leather protector to the leather industry. He will call on mills, manufacturers, finishers, and key retail establishments in California, Oregon and Washington.

Previous to joining 3M, Mr Holmes was a textile salesman for several years with Pacific Mills and Ely & Wlaker Dry Goods Company.

Richard D Wells, assistant director of Fabric Research Laboratories, Inc, Dedham, Mass, has been given a six-month leave of absence from FRL in order to devote full time to Air Reduction Chemical Company's polyvinyl alcohol fiber program.

Mr Wells and other scientists and engineers at FRL have been working on technical and market studies of the vinylon fiber (made in Japan from polyvinyl alcohol resin) for several months. The accelerated pace of the program has necessitated the full-time attention of Mr Wells in New York, while FRL will continue laboratory studies of the fiber in Dedham.

Previous to joining FRL in early 1957, Mr Wells was director of research and development for the Bates Manufacturing Co, Lewiston, Maine.

The North Carolina State College Chapter of Phi Psi, national honorary textile fraternity, recently presented its "Man of the Year" award for distinguished service to the textile industry to **William G Alligood** of Mount Holly, personnel director of American & Efird Mills, Inc.

A native of Washington, N C, and mayor of Mount Holly, Alligood received the award at a banquet at Scandia Village, near Raleigh. **Clay Smith** of Spindale, president of Phi Psi and a senior in the college's School of Textiles, read the citation honoring Alligood.

The award was presented to Mr Alligood by **Dr Malcolm E Campbell**, dean of State College's School of Textiles.

Finetex Incorporated has announced the appointment of **Robert E Singer** as sales manager in the New England district. Mr Singer will serve this area from their office in Cranston, R I.

Singer

Stempel

Mr Singer comes to Finetex after service with Emkay Chemical Company and Allied Chemical Corporation. He was graduated from Boston University and received his Master's degree from the same school. He will handle the sales of Finetex's surfactants, sulfonated oils, detergents and textile auxiliaries.

The election of **Murray Stempel** as President of Morningstar-Paisley, Inc by the Board of Directors, has been announced by **Joseph Morningstar**, Chairman of the Board. Mr Stempel succeeds **George J Muller**, who has been elected Vice-Chairman of the Board.

Mr Stempel, who has been associated with the Morningstar companies for the past 35 years, was previously Executive Vice President of Morningstar-Paisley. In 1931, he started an adhesives plant in Chicago, and Paisley Products, Inc was formed as a wholly-owned subsidiary of Morningstar to operate this facility, with Mr Stempel as Executive Vice President. When Morningstar, Nicol, Inc merged with Paisley Products, Inc early in 1957, Mr Stempel was elected Executive Vice President of the combined operations.

Dr Stanton B Smith has joined Arthur D Little, Inc, the Cambridge (Mass) industrial research consultants, as head of the instrumental analysis and development group. He was supervisor of physical and analytical chemistry research for Pittsburgh Coke & Chemical Co and previously had been associated with the Manhattan Project at Oak Ridge.

Election of **F B Patton** as Senior Vice President of Armour and Company is announced by William Wood Prince, President.

Mr Patton has been a Vice President of the Company since 1955 and he formerly was in charge of the Armour Auxiliaries Division, 1355 W Thirty-first St, Chicago. In his new assignment, he will assist **E W Wilson**, Executive Vice President, in administration of the divisions of Armour Chemical Industries.

The Armour Auxiliaries Division designation, which covered a group of the Company's nonfood products, will be discontinued. The Armour soap business has been combined with canned foods in a new Grocery Products Division, as previously announced. The Chemical Division will handle production and sale of fatty acids, fatty acid derivatives, industrial oils and anhydrous ammonia. Armour Alliance Industries, a new grouping, will handle production and sale of coated abrasives, cushioning products and adhesives. Headquarters are in Alliance, Ohio.

Mr Patton will be located in the Armour general office at 401 N Wabash Ave. Grocery Products Division and Chemical Division offices are at the Thirty-first street address.

Robert Feigin has joined the research staff of The Tanatex Chemical Corporation, Kearny, N J, as Senior Research Chemist. He is a graduate of The City College of New York and has an M A from The Polytechnic Institute of Brooklyn. He is a member of Sigma Xi Honor Society, and of The American Chemical Society. He was formerly Assistant to the Technical Director of Anderson Oil & Chemical Company and previously with Alrose Chemical Company as Chief Chemist in charge of Technical Service and Application.

Jacob Fox has joined the research staff of The Tanatex Chemical Corporation, Kearny, New Jersey, as Assistant Research Chemist. He is a graduate of New York University and a member of The American Chemical Society. He was previously Supervisory Chemist for the Army Pictorial Center.

Kirk P Ferguson has been named manager of the New York district office of the Du Pont Company's Dyes and Chemicals Division, succeeding Sidney M Conn who, pending his retirement June 30, will act as consultant to the New York office.

Mr Ferguson, whose appointment became effective May 1, had been assistant district manager for the last three and a half years.

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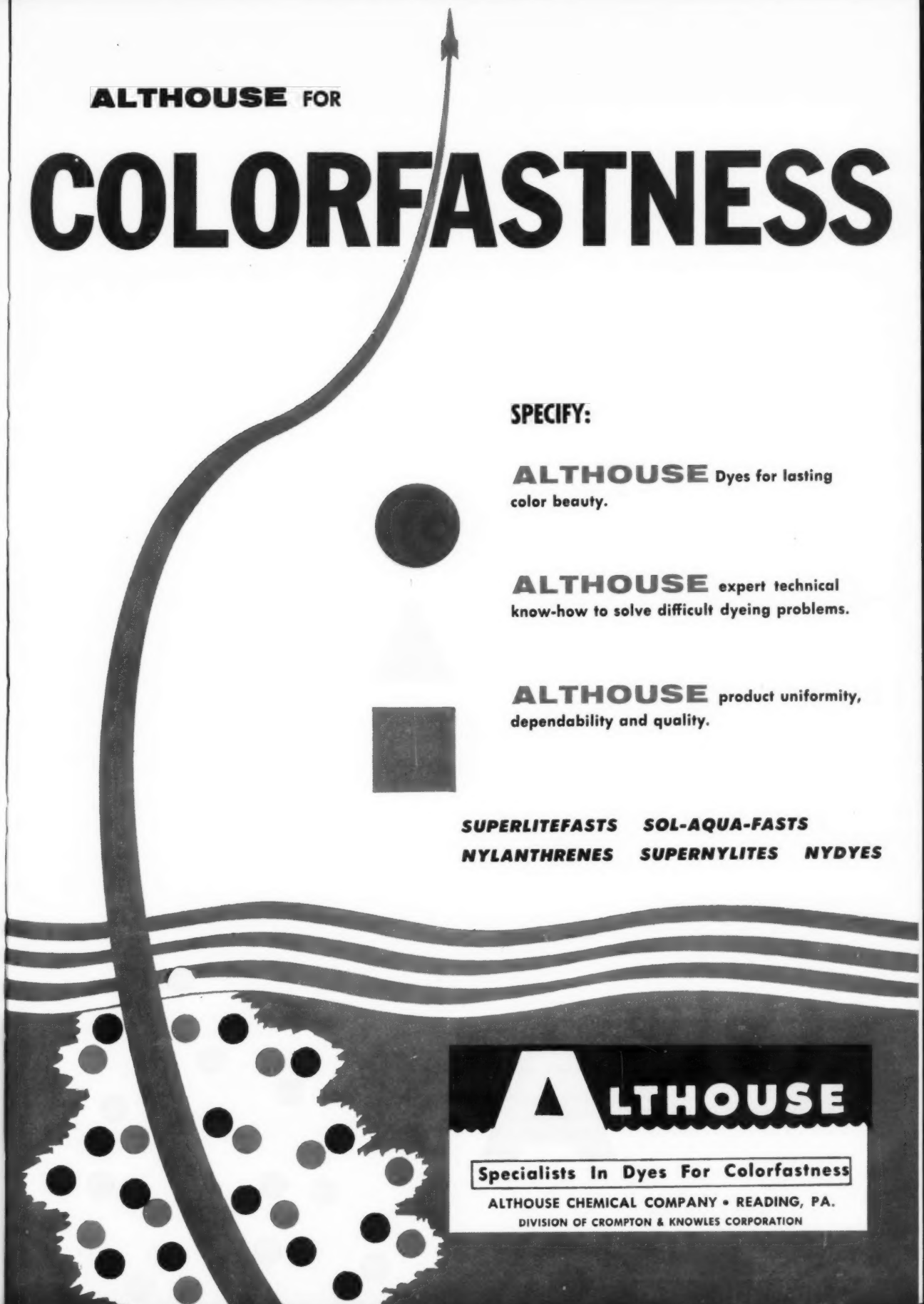

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DIVISION OF CROMPTON & KNOWLES CORPORATION

A native of Gaffney, S C, and a graduate of Virginia Military Institute, Mr Ferguson joined Du Pont's Dyes and Chemicals Division in 1940 and was assigned the following year to the Chicago office for field sales training. After four years of World War II military service, he returned to the Chicago office late in 1946 as a salesman and in 1952 was named dye sales supervisor. In 1953 he became manager of the lakes, paper, and leather section of the dye sales division in Wilmington and two years later was named to his most recent position as assistant manager of the New York district office.

The appointment of **R Karl Van Leer**, of Lincoln, Massachusetts, as marketing research specialist in organic chemicals has been announced by **Albert W Warren**, marketing research manager, Dewey and Almy Chemical Division, W R Grace & Co, Cambridge, Mass.

Mr Van Leer was formerly with the Dow Chemical Company. He received a B S in agronomy from Cornell University in 1953 and an M B A in marketing from Cornell in 1957. He is a member of the Greater Boston Chapter, American Marketing Association.

Jack V Schurman, Chemical Research Manager, has assumed new responsibilities in a realignment of Colgate-Palmolive Company's Corporate Research Department.

Dr John R Brown, Jr. Vice President for Research and Development, announced that Mr. Schurman will supervise the activities of the Analytical and Instruments Section in addition to the Basic Chemical Research Section at the Colgate research laboratories in Jersey City.

At the same time, Dr Brown announced the appointment of **Dr Morton B Epstein**, a Scientist in the Basic Chemical Research Section, as head of that Section to assist Mr Schurman in his expanded duties.

Dr Brown said the realignment, which also included the creation of a Pioneering Research Area headed by **Gilbert M Leigh**, has strengthened the Company's staff organization for its expanded activities in the research and development field.

Mr. Schurman, who received his MS degree from Brooklyn Polytechnic Institute, started his Colgate career in 1950 as a research chemist and was appointed Manager of the Basic Chemical Research Section in 1957. He is a member of the American Oil Chemists Society and the American Chemical Society.

Formerly a research associate at the National Bureau of Standards, Dr Epstein first joined the Company's research staff in 1949. He left in 1954 to head Applications Research for Onyx Oil and Chemical Company and resigned the position of Assistant Director of Research there to return to Colgate-Palmolive three years later.

Dr Epstein, who was awarded his doctorate at the University of Illinois, has had wide experience in colloid and surface chemistry, physical inorganic chemistry and thermodynamics. He also is a member of the American Oil Chemists Society and the American Chemical Society.

The appointment of **James T. Keefe, Jr**, of Lowell, Mass, as New Product Development Manager in the Battery, Polyfibron and Textile Division of the Dewey and Almy Chemical Division, W R Grace & Co, Cambridge, Massachusetts, has been announced by Russell L Haden, Jr, general manager of the Battery, Polyfibron and Textile Division. Mr. Keefe joined Dewey and Almy in 1956, and in 1957 was appointed product manager in charge of sales of Sodasorb, Dewey and Almy's carbon dioxide absorbent for hospital use. He was formerly with the Upjohn Company and Wm Filenes' Sons Department Store. He received a B S in chemistry from Bowdoin College in 1949.

The Battery, Polyfibron and Textile Division manufactures continuous blankets for textile printing ranges, and a wide range of other products combining fibers and polymers.

Dr Milton Harris was elected President-elect of the American Institute of Chemists at their annual meeting held recently in Atlantic City. Dr Harris is Vice-President for Research of the Gillette Company and President of Harris Research Laboratories, Inc.

OBITUARY

BENJAMIN GOLDSTEIN

Benjamin Goldstein, 66, of 22 Nightingale Street, Dorchester, Mass., a retired chemist, died recently at the Veterans Administration Hospital in Jamaica Plain after a short illness.

Born in Boston, he was educated in the Boston schools and was graduated from Johns Hopkins University in Baltimore. Until retirement three years ago, he was associated with Frank Hartley & Sons in Portsmouth, N H. He was previously with Crystal Color & Chemical Works in Cordaville, Mass. A World War I veteran of the Army Chemical Corps, he was a member of the Jewish Beneveolet Association in Dorchester and the American Chemical Association of America.

LAWTON W CLEVELAND

Lawton W Cleveland, 4 N Kensington Road, Asheville, N C, died of a heart attack in Paris, France on April 15, 1959, only one week after he and his wife arrived in Europe to spend a six month holiday touring Southern Europe and England.

Mr. Cleveland was born in Holyoke, Mass, December 11, 1899, was a Veteran of World War I, in the 11th Field Artillery Battalion, a graduate of Lowell Textile School, 32nd Degree Mason, member of George H Tabor Lodge, Fairhaven, Mass, Deacon in First Presbyterian Church, Raleigh, N C, and a member of the American Legion.

Mr. Cleveland was General Superintendent of Beacon Manufacturing Company, Swannanoa, N. C. from 1926 to 1949 and was associated with Burlington Industries, Inc from 1950 to 1957, at which time he retired from active business participation.

GEORGE THOMPSON

Funeral services were held on May 29 for Dr. George Thomson, 60, who passed away on May 26. Dr. Thomson was Assistant Director of Fabric Research Laboratories, Inc., Dedham, Mass.

A research chemist since receiving his Ph.D. from Massachusetts Institute of Technology in 1930, Dr. Thomson held several patents and was the author of several papers on his research. Recently he had been involved in pioneering research on the use of ultravolet reflectance techniques in the study of textile and plastic materials.

Professionally, he was a member of the American Chemical Society, the American Association of Textile Chemists and Colorists, and the Society of the Sigma Xi. Dr. Thomson was also a past Master of Richard Maclaurin Lodge (Massachusetts Institute of Technology), A.F. & A.M., and a Deacon of the Second Church in Dorchester.

NEW PRODUCTS AND DEVELOPMENTS

Royalene Fibers

A line of synthetic textile fibers, especially "tailored" for a wide variety of end uses, is now being produced by the footwear and general products division of United States Rubber Co.

Called Royalene, the polyethylene and polypropylene fibers are said to have outstanding properties for applications ranging from nautical ropes to coaxial cable braid.

Six types of fibers are produced for groups of end uses demanding special characteristics. In addition, the fibers are offered in round, flat, oval or ribbon shapes; in sizes ranging from six mils to 35 mils and in six colors.

The six types of Royalene are:

1) A high-tenacity linear polyethylene reportedly having highest strength, heat, abrasion and chemical resistance, designated as type "A."

2) A fiber specially compounded for shrinkage, for heat and chemical resistance, providing unusual effects, such as three-dimensional fabrics; designated as type "C."

3) A fiber with very high shrinkage in boiling water, making it useful for pronounced effects either alone or with other fibers, type "E."

4) An electrical grade for applications requiring conformity to Bell Laboratories' specifications for insulation, type "L."

5) A polypropylene for higher heat resistance and resistance to creep under sustained loading, type "P." Polypropylene also lends itself to multi-filament applications.

6) A high-density copolymer polyethylene reportedly having superior resistance to creep under load, and retaining physical properties of the highest grade linear polyethylene, type "N."

Available colors include clear, white, bright yellow, international orange, cardinal red, maroon, deep blue, dark green and black. Laboratory reports are said to show no color change after 200 hours in a standard Fade-Ometer.

Among suggested end uses for the fiber are nautical ropes, auto seat covers, filter cloths, decorative screening, shoe webbings, flat ropes, tow targets, handbag fabrics, upholstery, and outdoor furniture webbing.

Types C & E compounded for shrinkage are currently being used by U S Rubber's textile division to make Trilok, the three-dimensional fabric used for decorative and special-purpose industrial fabrics, such as air filters.

Advance

United States Rubber Co is introducing a new line of Naugaweave for furniture upholstery called Advance, with the breathability, soft look and feel of fabric and the durability and cleanability of vinyl, Thomas Martin, sales manager, recently announced.

Advance is made in the company's Stoughton, Wis, plant, by a new manufacturing process that reportedly combines vinyl and fabric, with valley printing and embossing on a discontinuous pattern. Metallic flitters are used for subtle highlighting.

The printing of blended colors deep into the textured surface valleys gives a three-dimensional look to the upholstery, Mr Martin stated. Advance is said to be soft, easy to tailor, beautiful to look at, and very comfortable in feel.

It is being introduced by U S Rubber in ten colors—blue, mocha, gold, cardinal, spice brown, turquoise, grass green, charcoal, tangerine and antique white. It is 54 inches wide and will be sold in 30 yard rolls through distributors and direct to volume furniture manufacturers.

New Caprolactam Booklet

A new, revised, and enlarged Caprolactam technical bulletin has been prepared by Allied Chemical's National Aniline Division, the largest domestic producer of Caprolactam monomer which is utilized in the preparation of Nylon 6 for textile fibers, tire cord, film, plastics, and resins.

The physical and chemical properties of this versatile material are presented in addition to a discussion of the various reported uses including applications in textiles, cordage, plastics, films and foils, coatings, treated papers, photographic emulsions, leather, adhesives, rubber, printing pastes and dyes, lubricants, solvents, and organic synthetics. Chemical reaction routes to commercial possibilities are explained and schematically diagramed.

Copies of Technical Bulletin I-14R (revised), may be obtained by writing Public Relations Dept., Allied Chemical Corporation, National Aniline Division, 40 Rector Street, New York 6, New York.

Resipon Wash-Wear Finish

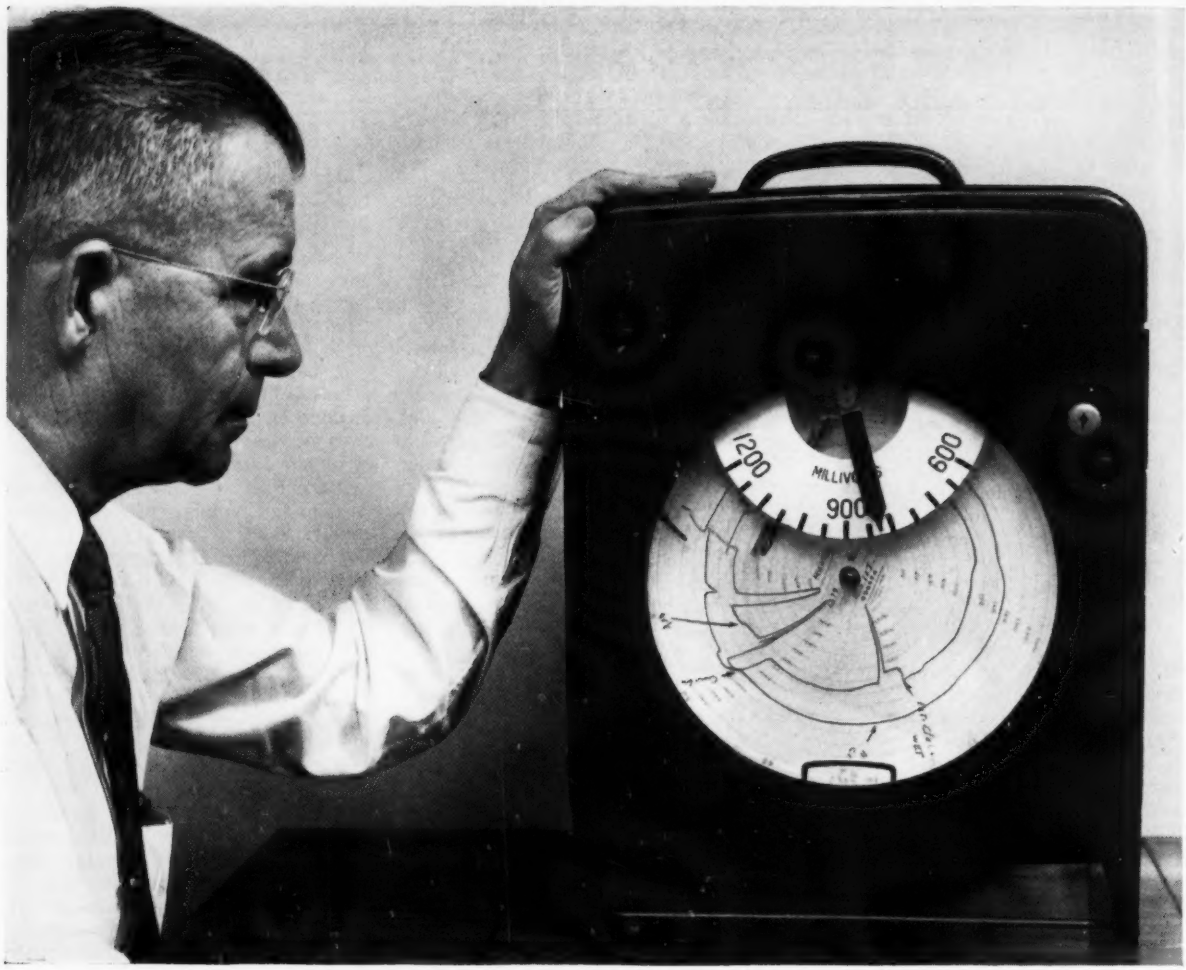
A new wash-and-wear finish for cellulosic fabrics claimed to remain durable to repeated commercial launderings, and overcome the problem of tensile loss, odor and chlorine retention, has been developed by the Arkansas Company, Newark, New Jersey.

According to C M Braham, president, the new finish is based on a new type of cyclic formaldehyde thermosetting resin called Resipon NDC and has particular application to the shirtings field. The product, he declared, produces "exceptionally durable crush- and shrink-resistant effects on cellulosic fabrics." It is highly efficient for finishing broadcloth, he said.

Discussing the technical nature of the new finish, Mr Braham noted that Resipon NDC is a water white liquid of indefinite shelf life. He recommends its use with an acid catalyst in accordance with conventional finishing practices. Emphasizing the protection the resin provides, Mr Braham declared, "Treated fabrics are completely resistant against chlorine retention and bleach-scorch damage even when aged and exposed to adverse storage and laundering conditions." He cited mill-run tests showing no significant loss in breaking strength after 10 and 20 home launderings and 10 commercial launderings. The bleach and scorch test used were made in accordance with American Association of Textile Chemists & Colorist procedures (Tentative Test Method 69-1958).

Resipon NDC contains 45 per cent active ingredients and has a pH of 6.5 to 7.0 (1 per cent solution) and is soluble in water in all proportions. It is compatible with most textile resins and other additives commonly used in resin finishes. Test results were given based on the following application details: Broadcloth, 40 inches, 136x68, finished with 15 per cent Resipon NDC and 3 per cent catalyst dried then cured for three minutes at 310 degrees F followed by a mild wash with ¼ per cent soda ash and ⅒ per cent sodium perborate.

(Continued on page 84)



Looks like you need LYKOPON

Trouble on the continuous dye range shows clearly in fluctuations on the electronically-traced Marhen graph. There could be two reasons—a need for LYKOPON concentrated sodium hydrosulfite or the service that goes with it.

For instance, you may actually be using too much hydrosulfite. Rohm & Haas service has uncovered cases where up to 25 percent more hydrosulfite than needed was being used.

But where testing uncovers a need for hydrosulfite, it's usually a clear case for LYKOPON. LYKOPON has uniform strength (94% minimum guaranteed, as shipped). This, and its unusual freedom from dusting, have made it the long-time favorite of textile finishers everywhere.

If you suspect there's more profit in dyeing than you're getting, why not be sure? Ask us for a Marhen test in your plant. Use its findings to get faster dyeing, more uniform quality, better efficiency.

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LYKOPON

News of the Trade

Officers, IRI

Industrial Research Institute, Inc., an organization composed of the nation's top industrial scientists representing 160 major manufacturing companies, today named Dr Robert W Cairns president and R G Chollar vice president and president-elect. Dr. Cairns is Director of Research, Hercules Powder Company, Inc., and Mr. Chollar is Vice President, Research and Development, National Cash Register Company.

New members elected to the Board of Directors are: James Hillier, Vice President, RCA Laboratories; and George L Royer, Administrative Director, Central Research Division, American Cyanamid Company.

The Industrial Research Institute, Inc is dedicated to improving the techniques of research organization and management. The top executives who represent their companies in IRI direct the research activities of approximately 145,000 people and are responsible for annual research expenditures of over one-and-one-half billion dollars.

New Wallerstein Administration Building

The Wallerstein Company celebrated the opening of its new administration building at Mariners Harbor, Staten Island, on Saturday afternoon, May 23d, with a Family Day Open House for all employees and their families.

The administration building, opened on May 4th, houses the executive, sales, and general offices of the Wallerstein Company. For the first time in forty years the offices, manufacturing facilities and laboratories are located together at the plant site at Wallerstein Square in Mariners Harbor. This grouping of the executive, technical and production departments will provide Wallerstein with an opportunity for greater service to its customers.

Displays were set up to exhibit Wallerstein's own broad line of products together with finished consumer products marketed by many of Wallerstein's customers.

The recent construction and opening of the new administration building is another step forward in Wallerstein's development program for the future. From its beginning in 1902 as a small analytical laboratory, the Wallerstein Company has grown to its present leading position as an authority on the industrial application of enzymes. Its enzymatic products are used in the brewing, leather tanning, textile, baking, pharmaceutical, meat packing, paper, and dry cleaning industries.

The present story of the company can be summed up by remarks recently made by Arthur C. Emelin, President of Wallerstein Company. "Wallerstein has achieved its position of leadership through the teamwork of all its employees. With such spirit and cooperation, this company will continue to meet its ever increasing responsibilities to its customers, employees, and the community."

Jonell Leases Additional Space

The Jonell Chemical Corporation's dyeing and finishing plant has leased over 30,000 square feet of space in the Whittenton Manufacturing Company's plant in Taunton, Mass. Production at the present location in East Taunton, Mass, will continue until early fall at which time new machinery installation at the Whittenton plant will be complete. The company specializes in processing jute fabrics and cotton novelties up to 60 inches wide. The Jonell Corporation purchased the burlap processing business including equipment from The Chandler Mfg Company of East Taunton, Mass last July.

Harris Research Quarters

Harris Research Laboratories, Inc, a private consulting laboratory for the textile and allied chemical industries, recently marked the opening of their new facilities with an open house for Washington scientists. About 250 guests attended the affair, which included guided tours and technical exhibits.

The new two-story building has approximately 18,000 square feet of floor space, all air conditioned, and is of brick and steel construction. There are three separate, completely equipped laboratory areas. Special facilities include an optical room, dark room, and a textile wet processing pilot area. A large, centrally located constant temperature and humidity room is equipped with instruments for the measurement of mechanical and physical properties of fibers, yarns, and fabrics. The building also houses a library, and a lecture room which can be subdivided into two conference chambers.

A special laboratory for surface physics and chemistry has been provided, with fresh, dust-free air, at constant temperature and relative humidity. Equipment is available for the measurement of surface tension, film properties, contact angle, friction measurements, and microscopic studies.

Harris Research Laboratories' new facilities will serve to expand and diversify its work for the textile and allied industries, and for Government agencies.

In the textile field, the Laboratory has worked with all of the important natural and synthetic fibers in the area of fiber properties and their correlation with chemical structure, functional properties of textiles in terms of specific end uses, fabric structure, fabric blends, and chemical modification to alter functional properties, including wash-and-wear and comfort in clothing. Such research has involved both industrial textiles, in which performance is often the sole requirement, and clothing items in which esthetic properties are very important.

The Laboratory works for the chemical industry in the development or application of chemicals for the textile industry. In this connection, research in the fields of detergency and chemical finishing are specialties.

Of a total staff of 60, the technically trained staff of 50 includes chemists, chemical engineers, physicists, textile technologists, and other specialists.

Antistatic Finishes Endorsed

The Chemstrand Corporation, producer of Acrilan acrylic fiber, has endorsed 70 specific antistatic finishes for fabrics made of Acrilan.

Although Acrilan staple is shipped with a finish which gives adequate static protection during textile processing operations, the company stated, the original finish is, to some extent, removed during fabric scouring and

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dyeing, thus making the application of an additional antistatic finish often desirable. Chemstrand recommended that, in order to attain maximum efficiency from any of the antistatic agents which give durable static protection to Acrilan fabrics after 5 washings or from any of those agents which impart good temporary static protection, the selected agents should be applied to the fabric in the last rinse before dyeing.

Since many of the cationic and anionic type antistatic agents recommended are also used as softening agents, the company announced, the hand of the goods is often improved. A list of the recommended antistatic agents and their method of application is available upon request from The Chemstrand Corporation's Technical Sales Service Department in Decatur, Alabama.

Ontario Section, CATCC, Anniversary

The committee in charge of arrangements for the 25th Silver Anniversary to be held in Hamilton at the Sheraton-Connaught Hotel on Saturday February 6, 1960, has been chosen and are actively engaged in making the necessary preparations for this gala event.

The committee members are as follows:

President, N Mohoruk
General Chairman, E P Carney
Reception, C B Musgrave, G Morrison
Publicity, H Eastwood
Entertainment, J Minaker
Sub Committee, J Camelford, A McCaskie, H Parkinson, J Mansfield, D Cooper, S Hall

PTI Research Center

Plans to develop one of the nation's most advanced textile research centers on the Germantown campus of Philadelphia Textile Institute were announced recently.

Dr Bertram W Hayward, PTI president, said the ultra-modern facilities would enable the nation's oldest textile college to expand immensely its research service for every phase of the textile industry. Development of the textile research center, he said, is being spurred by PTI's Diamond Jubilee Progress Fund. Dr Frederic H Barth is general chairman of the drive. It seeks $150,000 to improve the college's educational as well as research services. Announcement of the development plans came as PTI completed work on its 7,500th research project.

PTI's research program, Dr Hayward said, has grown with the college over the past three-quarters of a century. It has worked on application research projects with more than 750 corporations, universities and Governmental agencies.

One of PTI's most notable research achievements has been the development, with Baylor University, of a knitted artificial aorta of Dacron. It is stated that the tubes already have saved hundreds of lives in surgery and are now being produced commercially. Among the many directions taken by PTI research have been projects to improve products, develop new products, find better uses for yarns and fabrics and to create better processing methods. By far the greater portion of PTI's research work has been concentrated in the solution of specific problems for the textile industry. This has included study and testing of new fibers, new finishes and new treatments.

Private firms that have given PTI research contracts have included:

Behr-Manning Corp, Buffalo Electro-Chemical Co, Chicopee Manufacturing Co, Cluett-Peabody Co. Inc, Dy-Dee Wash, Inc, Epstein Bros, General Electric Co, Givaudan-Delawanna, Inc, Henry Bower Chemical Co, Hart-Foster Co, Keasbey-Mattison Co, John Fillman Co, John Walther Manufacturing Co, National Foam System, Inc, Pellisier, Jonas & Rivet, Inc, Philadelphia Penn Worsted Co, Pioneer Salt Co, Prison Industries Board, Prodesco, Inc, Quaker Chemical Co, Rock River Woolen Mills, Scholler Bros, Inc, Sherwin-Williams Co, Simmons Co, Schuylkill Chemical Co, Sharples Chemicals, Inc, Stehli Co, Inc, Swift & Co, Vegetable Ivory Institute and Virginia-Carolina Chemical Corp.

Labeling Rules Panel

Ralph J Bachenheimer, Iselin-Jefferson Company, Inc, Chairman of the Textile Section, New York Board of Trade, announces that Robert T Lynn, Burlington Industries, who is Chairman of the ACMI, Special Textile Labeling Committee, Ephraim Freedman, Director, Bureau of Standards, Macy's, and Sidney S Korzenik, Executive Director and Counsel, National Knitted Outerwear Association, have joined Harvey Hannah, Chief, Wool and Fur Labeling Division, Federal Trade Commission, on the panel to discuss labeling rules under the Textile Fiber Products Identification Act at the Luncheon Meeting, Hotel Astor, Wednesday, July 1st.

Members of the Textile and Apparel Industries, as well as Retailers and others who may be interested in this very important Law, are invited to attend.

Reservations for the Luncheon may be made through the Secretary's Office of the Textile Section, One Liberty Street, BOwling Green 9-2600.

New Company in the Textile Field

A major corporate realignment encompassing the formation of a new company which will be active in the textile field, has just been announced by Miles Laboratories, Elkhart, Ind. The new organization has been named the Miles Chemical Company and is one of four main divisions of the parent corporation.

It consolidates into one the Sumner Chemical Company, Zeeland, Mich, makers of fine organic chemicals; Takamine Laboratory division, Clifton, NJ, manufacturers of industrial enzymes; and citric acid production, Elkhart, Ind.

In the past, Takamine has been active in the textile industry through the sale of enzymes for desizing of textiles and degumming of silks. Sumner is also active with polymeric dialdehyde for increasing crease resistance and water proofing. Present plans call for increased activity in this area.

Howard F Roderick has been named president of the new company. He joined Miles Laboratories in January, 1959, as vice president and most recently was named to the Board of Directors. Administrative and marketing headquarters under the new arrangement will be in Elkhart, Ind.

In making the announcement about the realignment, Miles Laboratories President Walter R Beardsley said, "The move is being taken at this time to insure optimum efficiency, both internally and externally. The anticipated growth of this division, coupled with the complexity and variety of its products, is bringing about the need for a high degree of autonomy.

"By establishing Miles Chemical Company, we will be better able to achieve a higher concentration on the part of management for the specialized activities in this area. At the same time we are combining these varied chemical procedures under a single, experienced administrator.

"We expect that the unification of all components of a chemical nature into a single, larger entity will provide over-all strengthening in marketing, product development, research, sales and customer service."

Prior to joining Miles Laboratories, Mr Roderick was vice president of International Minerals & Chemical Corp in Chicago and was director of research and later director of sales for Wyandotte Chemical Corporation. He holds a BS degree in chemical engineering from the University of Michigan.

Roderick said immediate goals under the new arrangement will be the establishment of an integrated sales force, research and product development programs. Long-range, he noted expansion into international production, additional acquisitions and moves into new markets are high on the priority list.

He said, "Our objective is to keep pace with—and exceed wherever we can—over-all corporate growth. We feel diversification into new areas through research and acquisition are two of the keys to this growth. First we must assimilate what we have. Simultaneously, we are accelerating our explorations into the unending possibilities for growth before us."

Sumner was acquired by Miles Laboratories in 1946 and Takamine in 1956. Miles pioneered the development of a unique submerged fermentation process for producing citric acid and erected a plant in Elkhart which began operations in 1952. Currently a $3.6 million expansion program is under way which, when completed in Fall, 1959, will enable Miles to more than double its present output of citric acid.

The Sumner and Takamine names will continue to be used in connection with their products for an indefinite "transitional" period, according to Roderick.

Greenville Steel and Carolina Steel Merge

The Greenville Steel & Foundry Co of Greenville, SC has merged by a stock exchange with the Carolina Steel Corporation of Greensboro, NC. N P Hayes, President of Carolina Steel Corporation, has been elected President of the Greenville Steel & Foundry Division. D H Wallace, Jr was elected Chairman of the Board of the Greenville Steel & Foundry Division. Thomas P Noe was elected Executive Vice-President in charge of operations.

The Greenville Steel & Foundry Division will continue to manufacture, and expects to expand, their complete line of wet-processing equipment for the textile industry. They presently manufacture continuous bleaching ranges, continuous dye ranges, continuous desizing ranges, as well as individual items such as pads, saturators, wash boxes, steamers, dry cans, dye becks, agers, and auxiliary stainless steel rolls, tanks and special textile processing machinery.

Parrott & Ballentine, 3440 Augusta Road, Greenville, SC, sales agents for Greenville Steel & Foundry Co for textile machinery, will continue to handle the sales for the Greenville Steel & Foundry Division to the textile trade. By virtue of this merger, the Greenville Steel Division is strengthened and plans a more vigorous manufacturing program and sales activity for their customers in the textile wet processing field.

Koppers Buys Plant From Union Carbide

Purchase of the Halowax plant of Union Carbide Corporation at Wyandotte, Mich, by Koppers Company, Inc was announced recently by Fred C Foy, Chairman and President of Koppers.

Mr Foy said that Koppers has purchased the physical assets and inventory of the plant which produces chlorinated naphthalene, chlorinated paraffin and several other chlorinated chemicals and resins, and that it will be operated by the Company's Tar Products Division.

The acquisition brings the number of Koppers plants to 70 in 30 states, with an additional plant being located in Canada.

F L Byrom, Vice President and General Manager of Koppers Tar Division, said that no changes are contemplated in the personnel of the plant or its operation. Don H Seeds, plant superintendent, has agreed to join the Koppers organization in the same capacity. Mr Byrom also stated that ultimately Koppers hopes to add new products to the plant's line.

The Halowax plant is located on ground leased from the Pennsalt Chemicals Corporation. Koppers expects to sign a long-term lease for the use of the property and a number of buildings which are owned by Pennsalt.

Major raw materials used in the Halowax plant are chlorine and naphthalene. Chlorine is furnished by pipe-line from adjacent plants of Pennsalt and the Wyandotte Chemicals Corp. Naphthalene will be furnished from other plants of Koppers Tar Products Division, a large producer of this chemical.

Borden Directory of Polymer Products

An eight-page directory of its various polymer products and their specific properties as well as uses is being made available by the Borden Chemical Company to the paper, paint, textile, and adhesives industries.

Prepared by the company's Polyco-Monomer Department, the directory lists a complete line of polyvinyl acetate emulsions and solutions, styrene-butadiene emulsions, acrylic emulsions and solutions, polystyrene emulsions, sodium polyacrylate thickeners, polyvinyl alcohols, and polyvinyl acetate bead resins.

The directory also lists the Borden sales offices and the plants which produce the products throughout the United States.

Copies may be obtained from the Borden Chemical Company, Polyco-Monomer Department, 350 Madison Avenue, New York 17, NY.

General Calendar

AMERICAN OIL CHEMISTS SOCIETY
Sept 28-30 (Statler Hotel, Los Angeles, Calif)

AMERICAN TEXTILE MACHINERY ASSOCIATION
May 23-27, 1960 (American Textile Machinery Exhibition, Auditorium, Atlantic City, NJ)

ASSOCIAZIONE COSTRUTTORI ITALIANI DI MACCHINARIO PER L'INDUSTRIA TESSILE
September 12-21 (3rd International Textile Machinery Exhibition, Milan Fair, Milan, Italy)

CANADIAN ASSOCIATION OF TEXTILE COLOURISTS AND CHEMISTS (QUEBEC SECTION)
June 20 (Annual Golf Tournament)

DRUG, CHEMICAL AND ALLIED TRADES SECTION, NY BOARD OF TRADE
Sept 17-20 (69th Annual Meeting, Sagamore Hotel, Bolton Landing, Lake George, NY)

GORDON RESEARCH CONFERENCE ON TEXTILES
July 13-17 (Colby Jr College, New London, NH)

NATIONAL COTTON COUNCIL
Oct 7 (Chemical Finishing Conference, Mayflower Hotel, Washington, DC)

SYNTHETIC ORGANIC CHEMICAL MANUFACTURERS ASSOCIATION OF THE UNITED STATES
Sept 15, Oct 13, Nov 4 (Luncheon meetings at the Hotel Roosevelt, New York, NY); Dec 2 (Annual meeting and dinner—Hotel Roosevelt, New York, NY)

TEXTILE RESEARCH INSTITUTE
March 24-25, 1960 (30th Annual Meeting, Hotel Commodore, New York, NY)

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NEW PRODUCTS AND DEVELOPMENTS

(*Continued from page 77*)

Atcosoft XP and Atcosoft RO

Metro-Atlantic, Inc., Centredale, RI, announces the development of two new cationic softening agents, Atcosoft XP and Atcosoft RO.

Atcosoft XP was developed primarily for use as a softening agent in thermosetting resin finishes. It is said to give excellent bath stability and finishes produced with it are said to possess good resistance to yellowing from heat with no tendency to develop odor.

Atcosoft RO was specifically produced as an all-purpose softening agent for use on wool, silk, Orlon, nylon, Dacron, and the newer synthetic fibers. This product also is said to give good resistance to yellowing from heat and is compatible with other finishing agents.

It is stated that application of these products may be by padding or exhaustion methods to impart excellent softening effects on fibers.

Supralan Blue BG and Supralan Blue B3G

Supralan Blue BG and Supralan Blue B3G are two new premetallized neutral dyeing acid dyestuffs developed by the Dyestuff & Chemical Division of General Aniline & Film Corporation.

Supralan Blue BG and Supralan Blue B3G are reported as providing strong economical shades of greenish blue of very good fastness-to-light, washing, perspiration and rubbing. These dyestuffs are being recommended by General Aniline for dyeing wool or nylon rawstock, slubbing, yarns and piece goods. Mixtures of wool and nylon fabrics for the apparel trade and mixtures of cotton or rayon with nylon for upholstery fabrics are recommended end uses for these new dyestuffs.

Samples and literature are available from General Aniline on request, at 435 Hudson Street, New York, New York.

Neutral Developing Azoics

The production of advanced neutral developing azoics is now announced by the Pfister Chemical Works, Inc., Ridgefield, New Jersey. Recently developed, it is stated that these new azoics can be completely aged in neutral steam with full color yield and are suitable for printing with vats, directs and oxidation blacks. It is claimed that they offer better bleed resistance than other azoics during soaping off operations, and also provide good light fastness and excellent fastness to washing and chlorine. In addition, they are said to be the only azoics that can be aged together with fiber reactive dyes. Aging is also readily accomplished by passing through an acid bath or the usual acid steam process. Developed primarily for use on cotton or rayon, new Pfister azoics can also be applied on acetate or silk.

Pfister neutral developing azoics are available in 15 shades including black, bordeaux, blue, brown, scarlet, yellow, orange and red and can be provided in both powder and solution form. For more information and descriptive literature write to the manufacturer.

New Wax For Textile Processing

A new, chemically-reacted, microcrystalline wax, Sonowax 3450, for use in textile wet processing, has been developed by the Textile Chemicals Division of L Sonneborn Sons, Inc, 300 Fourth Ave, New York 10, NY.

The wax is a nonionic antistatic material, modified by a special process to accentuate its softening and plasticizing properties. Supplied as a cream to white colored emulsion, it can be readily diluted with water at room temperature to any desired application concentration.

Sonowax 3450 is said to be compatible with commercial resins and catalysts, and to be stable to acids, alkalies and salts. It is further said to be highly resistant to yellowing at elevated temperatures, to oxidation and odor development, and will not contribute to chlorine retention. It may be used in combination with resins or as a top finish by itself.

When used in production of wash-and-wear and crease-resistant cotton and synthetic fabrics, the wax is said to increase tear strength, abrasion resistance and crease recovery. It is stated that it lubricates and minimizes friction between the threads, resulting in improved wear, better "sewability" and reduced needle cutting. It is a valuable aid in glazing, embossing and schreinering.

Sonowax 3450 serves as a softener and plasticizer for starches and various types of warp sizes, and is reported to impart that "slickness" to the warps which results in higher weaving efficiency.

Low Crock OSE

Low Crock OSE is a new oil-soluble anticrocking agent announced by Eastern Color & Chemical Co, 35 Livingston St, Providence 4, RI, for use in machine roller printing. According to Eastern, Low Crock OSE effectively controls both wet and dry crocking of blotch prints and prints of dark shades.

To textile printers, Eastern stresses the important feature that Low Crock OSE is a stable oil-soluble emulsion and is therefore completely compatible with water-in-oil print paste with no loss in body or viscosity. Information on properties and application of Low Crock OSE is available.

Huber CWF

A bulletin describing Huber CWF, a new kaolin standard for the latex compounder and the textile industry, has been published by J M Huber Corporation, 630 Third Ave, New York 17, NY. Bulletin CWF outlines the physical properties of the clay and contains charts showing particle size distribution and characteristics of CWF in water suspension. It also describes improvements to be achieved in pigment-water slurries, finished compounds and film properties. Huber CWF is said to be in rapidly-expanding use at every stage of handling latex, from compounding to finished product.

Properties of other Huber kaolins are also detailed in the bulletin. J M Huber Corporation offers a full range of washed as well as airfloated kaolins from Georgia and South Carolina.

Write for Bulletin CWF.

Cibacron Brown 3GR

Cibacron Brown 3GR is said to be the first reactive brown to be mar-

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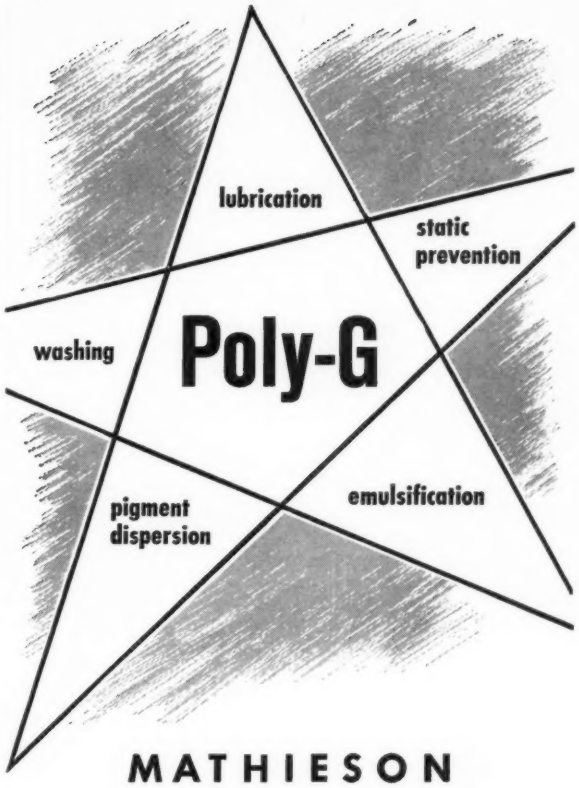

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polyethylene glycols

Poly-G polyethylene glycols are produced by Olin Mathieson in molecular weights ranging from 200 to 1500. Poly-G 200, 300, 400, and 600 are clear, odorless, viscous liquids soluble in water, acetone, ethanol, ethyl acetate and toluene. Poly-G 1000 and 1500 are white waxy solids having slightly less water solubility than lower members of the series. Poly-G B1530, a white waxy solid, is a selected blend of Poly-G 1500 and Poly-G 300.

We'll be glad to send you detailed information, data sheets and samples of the Poly-G glycols. See your Olin Mathieson representative or write today.

MATHIESON

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keted anywhere—making it a notable new member of the Cibacron Dye family. It is said to have excellent light fastness and synthetic resins do not noticeably affect either shade or light fastness. It may be applied on all types of equipment by conventional methods.

Suitable for direct printing on cotton, rayon, wool and silk, the versatility of this newest Cibacron Dye is said to be further demonstrated by its excellence as a self shade and in combination with other dyes that do not require acid steaming for development. Light and medium shades are dischargable, and it builds up excellently from light and muted shades to rich dark browns with Cibacron Black BG.

Cibacron Brown 3GR can be used as a shading dye where its pure yellowish cast will be useful in producing scarlets with Cibacron Brilliant Red B or in producing bottle green shades in combination with Cibacron Blue 3G. Cibacron Brown 3GR is also very useful in the production of greys and tans. It is free of copper and manganese.

New Optical Colorimeter

A new model of Color-Eye, the dual - purpose Colorimeter and Abridged Spectrophotometer, has been announced by Instrument Development Laboratories, Inc, 67 Mechanic St, Attleboro, Mass. The new "Model D" Color-Eye combines the proven advantages of earlier models with several important new features. These features, standard in Model D, include a "flush sample viewing port" which allows the instrument to be placed against any flat, vertical surface for color measurements. The optical section contains a new photomultiplier with new, specially matched filters to provide more consistent match to CIE Standards. This new optical section improves sensitivity 10 fold and increases the present high sensitivity of the instrument in measuring colors throughout the entire range from very dark to light. The Color-Eye case has been restyled in a modern golden-tan hammertone finish. In addition, improved case design has reduced the dust entrance problem. Further information on the Model D Color-Eye is available from the manufacturer.

Emka Defoam

Emkay Chemical Company, Elizabeth, New Jersey now has available a four page brochure describing fully its new Emka Defoam. It is recommended for low cost foam and froth control. It is water dispersible, effective in acid and alkaline mixtures, compatible with most systems, and in liquid form for easy handling.

Emka Defoam is recommended by the manufacturers for industrial operations compounding adhesives, coatings, paints, resins, latex, etc. It is said to be beneficial in various procedures and processes such as scouring, dyeing, printing and finishing of textiles and beating, coating and finishing of paper. Standard package is 400-pound open head drum.

Brochure on Light Sources

"R_x for Color Blind Light Sources" is the title of a new brochure being offered by the Macbeth Daylighting Corporation, P O Box 950, Newburgh, New York. Using a cartoon technique, it discusses the problems facing industry in its efforts to provide proper illumination for color matching, color grading, color shading, etc. The brochure also includes photos of typical installations already in use, and an accompanying "Engineering Survey Form" offers the technical assistance of a Macbeth Engineering Salesman, who is qualified to make recommendations as to type and placement of Macbeth color corrected lighting.

The literature is free for the asking. Address all inquiries to Macbeth Daylighting Corporation, P O Box 950, Newburgh, New York.

THE AATCC CONVENTION ISSUE WILL APPEAR ON SEPTEMBER 21st

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